

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
200 STOVALL STREET
ALEXANDRIA, VIRGINIA 22332-2300

NAVFACINST 11230.1D
FAC 13
31 MAY 1996

NAVFAC INSTRUCTION 11230.1D

From: Commander, Naval Facilities Engineering Command

Subj: INSPECTION, CERTIFICATION, AND AUDIT OF CRANE AND RAILROAD TRACKAGE

1. Purpose. To provide procedures for inspection, certification, maintenance management and audit of crane and railroad trackage. Additional requirements and tests for special purpose/hazardous load carrying trackage may be specified in other documents.
2. Cancellation. NAVFACINST 11230.1C of 25 May 1988 is superseded.
3. Background. Crane and railroad trackage is a valuable facility asset that needs to be maintained in a safe operating condition, ready for current use or future mobilization purposes, where required. In the recent past, the General Accounting Office (GAO) has expressed serious concern regarding inspection and safety of Department of Defense (DOD) crane and railroad trackage. Review of in-service trackage validates the need for inspection and maintenance criteria to assist in evaluating the physical condition and ensuring the safety of all crane and railroad trackage used in support of naval operations.
4. Action. All naval activities with crane (ground and elevated) and railroad trackage on plant account shall comply with the provisions of this instruction. Activities shall establish an inspection and maintenance program or affirm or modify their existing program to encompass the criteria herein and shall take coordinated action to ensure implementation of this instruction. Naval Facilities Engineering Command (NAVFACENGCOM) shall administer this program for the Chief of Naval Operations (CNO). Activities shall have 12 months from date of issue of this instruction to qualify their own inspectors or establish a process to obtain this service such as outsourcing or teaming with another activity, in accordance with paragraph 2.0.1 and to implement a safety inspection program in accordance with paragraph 2.3.
5. Criteria provided in this instruction establishes minimum safety standards for track use. Routinely track shall be maintained to a higher condition standard in accordance with criteria in NAVFAC MO-103 and MO-103.9 and herein to ensure safe use.
6. Exceptions. Deviations from the standards set forth herein shall be submitted via the activity's major claimant to NAVFACENGCOM Code 13 for approval.

R. E. HAMMOND
Senior Executive for Public Works Support

Distribution: (5 copies each)

SNDL E3A (Laboratory ONR)
 F (Shore Activities under Command of the Chief of Naval Operations) (less FA28, FA41, FA45, FA48, FB57, FB59, FC11, FC15, FC18, FF8, FF18, FF71, FF73, FG5, FG9, FG11, FH, FJ, FL, FM, FO, FP, FR10, FR11, FR23, FS, FT9, FT19, FT52, FT74, FT105, FT109, FU, FV, and FW)
 V Shore Activities under the Command of Commandant of the Marine Corps (less V8, V10, V13, V15A, V22, V29)

Copy to:

A1 (Immediate Offices of the Secretary)
 A2A (Department of the Navy Staff Offices)
 (CNR, only)
 A6 (Headquarters, U. S. Marine Corps)
 21A (Fleet Commanders in Chief)
 23 (Force Commanders)
 24 (Type Commanders)
 E4A (General Counsel Branch Office)
 E7A (Audit Service Director)
 E7B (Audit Service)
 FT37 (Scol CEC officers) (10)

Department of the Army, Code DAEN MPO-B (Facilities Engineering Directorate, Office of the Chief of Engineers, Washington, DC)

DOD Military Traffic Management Command, Office of Assistant Secretary of Defense (I&F), Directorate of Transportation

Stocked by:

Stock No.

Defense Distribution Depot - Susquehanna PA
 Building 05
 5450 Carlisle Pike
 Mechanicsburg, PA 17055-0789

0525 LD 002 1880

LOCATOR CROSS-REFERENCE SHEET

Subj: INSPECTION, CERTIFICATION, AND AUDIT OF CRANE AND RAILROAD
TRACKAGE

See: (Recipient enter information as to where this instruction is maintained.)

RECORD OF CHANGES

CHANGE NUMBER	DATE OF CHANGE	DATE ENTERED	BY WHOM ENTERED
------------------	-------------------	-----------------	--------------------

INSPECTION, CERTIFICATION AND AUDIT OF CRANE AND RAILROAD TRACKAGE

<u>CONTENTS</u>	<u>SECTION</u>	<u>PAGE</u>
GENERAL	1.0	1
RR Trackage	1.1	1
Ground-Level Crane Trackage	1.2	1
Elevated Crane Trackage	1.3	1
INSPECTION	2.0	2
Track Inspector Qualifications	2.0.1	2
Continuous Operator Inspection	2.1	3
Scheduled Maintenance	2.2	3
Railroad Trackage Safety Inspection	2.3	3
Control Inspection	2.4	5
Visual	2.4.1	6
Operational Inspection	2.4.2	7
Measurements	2.4.3	9
Control Inspection Documentation	2.4.4	9
Certification	2.5	10
Audit	2.6	12
Non-Destructive Testing	2.7	13
Ultrasonic Inspection	2.7.1	14
Sounding	2.7.2	15
Test Results	2.7.3	15
Other Non-Destructive Tests	2.7.4	16
Miscellaneous Inspections and Tests	2.8	16
Underwater Inspection	2.9	16
Mishap Investigation	2.10	17
STANDARDS	3.0	18
Trackage	3.1	18
Railroad	3.1.1	18
Crane	3.1.2	19
Trackage Defect Classification	3.2	19
Catastrophic	3.2.1	19
Critical	3.2.2	20
Marginal	3.2.3	20
Rail	3.3	20
Rail Type	3.3.1	20
Rail Defects	3.3.2	21
Replacement	3.3.3	21
Track Geometry	3.4	22
Installation and Realignment	3.4.1	22
Horizontal Alignment	3.4.2	22
Grade	3.4.3	23
Cross Section Elevation	3.4.4	24
Gage	3.4.5	24
Frogs and Switches	3.5	25
Miscellaneous	3.6	26
Substructure	3.7	27
Crossties	3.8	28
RECORDS	4.0	29

NAVFACINST 11230.1D

ATTACHMENTS

- (1) FRA Track Safety Standards
- (2) Summary of In-Service Railroad Trackage Inspection Criteria
- (3) Summary of In-Service Crane Trackage Inspection Criteria
- (4) Standard Certification Document (sample format)
- (5) Standard Track Inspection Record (sample format)
- (6) Standard Turnout Inspection Checklist (sample format)

REFERENCED DOCUMENTS

NAVFAC MO-103	Maintenance of Trackage (Tri-Service)
NAVFAC MO-103.9	Navy Railroad Trackage Field Assessment Manual
NAVFAC MO-104	Maintenance of Waterfront Facilities (Tri-Service)
NAVFAC MO-104.2	Specialized Underwater Facilities Inspection
NAVFAC MO-311	Marine Biology Operational Handbook
NAVFAC MO-312.2	A Field Guide for The Receipt and Inspection of Treated Wood Products by Installation Personnel
NAVFAC MO-321	Facilities Management
NAVFAC MO-322	Vol I and II: Inspection of Shore Facilities
FRA Standards	The Department of Transportation (DOT), Federal Railroad Administration (FRA) Track Safety Standards in the Code of Federal Regulations (CFR) Title 49 Transportation, Chapter II Federal Railroad Administration, Part 213 Track Safety Standards; Attachment (1)
MIL-HDBK 1005/6	Trackage
MIL-HDBK 1025/1	Piers and Wharves
NAVFAC Design Manual 38	Weight Handling Equipment
NAVFAC P-300	Management of Transportation Equipment
NAVFAC P-301	Navy Railway Operating Handbook
NAVFAC P-307	Management of Weight Handling Equipment
MIL-STD-882C	System Safety Program Requirements
NFGS-05650	Railroad Trackwork
NFGS-05652	Welding Crane and Railroad Rail - Thermite Method
NFGS-14606	Portal Crane Track Installation
ANSI/ASNT CP189	1991 ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel
AREA	American Railway Engineering Association - Manual for Railway Engineering
OPNAVINST 5102.1C	Mishap Investigation and Reporting
OPNAVINST 5100.23D	Navy Occupational Safety and Health (NAVOSH) Program

INSPECTION, CERTIFICATION AND AUDIT OF CRANE AND RAILROAD TRACKAGE

SECTION 1. GENERAL

1.0 Railroad and crane trackage inspections, certifications and audits shall be performed at the frequencies and in the detail specified in this instruction. Where not specifically described in this instruction, the inspection and maintenance management program for trackage shall comply with appropriate NAVFAC Maintenance Manuals, including MO-321, MO-322, MO-103 and MO-103.9. In general, inspections shall consist of observing the functioning of the trackage as related to safety, maintenance and design parameters. Examination will be by sight, sound, feel, instrumentation and non-destructive testing. Inspection, certification and audit of trackage includes rails, ties, subgrade, supports, foundations, drainage appendages and accessories. Primary emphasis shall be given to ensuring maximum safety by maintaining all facilities in a safe and sound condition.

Where there is a difference in program or procedure, trackage will be divided into three Major Trackage Systems as defined below and discussed separately herein, when appropriate.

1.1 RAILROAD TRACKAGE. Railroad trackage applies to all track systems used by engines/locomotives, railcars or locomotive cranes including narrow gage systems.

1.2 GROUND-LEVEL CRANE TRACKAGE. Ground-level crane trackage applies to tracks for all weight handling equipment that operates at an activity. This includes but is not limited to trackage systems for portal, gantry, and the ground level rail for semi-gantry cranes.

1.3 ELEVATED CRANE TRACKAGE. Elevated crane trackage applies to all trackage systems attached to or suspended from side walls, columns, buildings, roofs or separate superstructures. This includes trackage for overhead or bridge cranes, wall cranes, and semi-gantry cranes.

NOTE: Rail inspections for monorails; jib crane rails; "H" Beam, "I" Beam, or other structural steel shape rail systems; and trolley trackage for jib or other type hoists are conducted by the crane inspector or building inspector in accordance with NAVFAC P-307 or NAVFAC MO-322. Guidelines for inspection, certification and audit for these types of rail systems are not included in this instruction.

SECTION 2. INSPECTION

2.0 Inspection and testing of trackage shall be performed by qualified activity personnel or by contract with assistance of NAVFACENGCOM Engineering Field Division (EFD) personnel when requested. The responsibility for providing qualified trackage inspection may be assigned to a Public Works Department (i.e. Facilities Management Engineering). Inspectors may designate a proposed degree-of-hazard (catastrophic, critical, or marginal) of a section or subsystem based on criteria contained herein and their judgment. Where there is any doubt regarding the seriousness of a defect, or a questionable safety condition, all use shall be stopped over the section of trackage involved until the deficiencies are corrected or until safe use is determined (see paragraph 2.5). Deficiencies designated as "catastrophic" or "critical" by inspection personnel shall be evaluated by the cognizant engineering or facilities management organization to determine corrective action and interim precautionary measures including "non-certification" or "restricted certification." Inspections shall be conducted according to the interval stated herein or more often when deemed necessary by the work supervisor or as directed by the Certifying Official.

2.0.1 TRACK INSPECTORS QUALIFICATIONS. Track Inspectors are responsible for conducting safety inspections (paragraph 2.3) and control inspections (paragraph 2.4) including visual and operational inspections. These inspections are more inclusive and exacting than scheduled maintenance inspections and shall be conducted by trained personnel. The Certifying Official shall designate qualified persons to inspect track for defects. Each person designated must have:

- (1) At least -
 - (a) 1 year of experience as a full time inspector working under the tutelage of a qualified experienced inspector; or
 - (b) A combination of experience in track inspection and training from a course in track inspection or from a college level educational program related to track inspection;
 and
 - (c) Attended NAVFACENGCOM Trackage Inspector Training Course or any equivalent course offered by the private industry or other government agencies.
- (2) Attend a refresher course in 1c above at least once every five years.
- (3) Demonstrates to the Certifying Official that as an inspector -
 - (a) Knows and understands the requirements of this instruction and the FRA Track Safety Standards.
 - (b) Can detect deviations from those requirements; and

- (c) Can prescribe appropriate remedial action to correct or safely compensate for those deviations.
- (4) Written authorization from Certifying Official to prescribe remedial actions to correct or safely compensate for deviations from the requirements of this instruction. The designation of the track inspector(s) by the Certifying Official shall be in writing and include the basis for each designation.

2.1 CONTINUOUS OPERATOR INSPECTION. Daily or prior to use safety checks listed in activity regulations shall be conducted. In addition, on-the-job observations shall be performed in accordance with P-301 and P-307 at all times when equipment is working. Crane and railroad operations personnel (operators, engineers, trackmen, riggers, etc.) shall be encouraged to observe and report track problems, deficiencies, obstructions and the "feel" of the track.

2.2 SCHEDULED MAINTENANCE (SM) - SM SERVICE AND SM INSPECTION. SM is a continuous working inspection, examination of component parts, lubrication, adjustment, and minor repair. NAVFAC manuals MO-103 "Maintenance of Trackage" and MO-322 "Inspection of Shore Facilities" Volumes I and II contain instructions on performing maintenance service and inspection and provide lists of check points. SM service and inspection are normally conducted by the crews assigned to or operating the equipment, by the track walkers, by Maintenance Shop personnel, and/or by contract. The SM Inspections and Services are scheduled as directed by the Public Works Officer or Activity Commander. Flexibility exists in the frequency of SM inspections based on usage, climatic conditions, history, and experience; therefore, the Public Works Officer or Activity Commander shall establish SM schedules. On systems where lubrication of moving parts, adjustments to electrical or mechanical systems, tightening of loose bolts, and other minor repairs are minimal, the SM service requirements may be identified during the safety inspection and annual control inspection and SM service and repair work scheduled. When possible, deficiencies are corrected during the inspection and recorded. Uncorrected deficiencies shall be reported to the supervisor for action, inclusion in the repair work schedule, adjustment of operating speed and consideration for closure of a section of trackage. Minimum information to be provided in SM reports is detailed in paragraph 4.6. SM inspections are visual inspections which include, but are not limited to, such items as loose or missing bolts, broken ties, defective switch points, loose spikes, loose or misaligned plates or rail anchors, inoperative switches, operator reported rough or soft spots, poor drainage, substructure failure, defective rail, settlement, condition of supporting columns and misalignment. The most important sections to be checked are the switches, curves and any area where a derailment has occurred.

2.3 RAILROAD TRACK SAFETY INSPECTION. Safety inspection is that inspection of railroad track performed in accordance with paragraphs 213.233, 213.235 and 213.239 of the FRA Track Safety Standards, Attachment (1) and as modified herein. The purpose of this inspection is to identify critical and catastrophic defects affecting the safety of the track being inspected. Safety inspection can be accomplished in conjunction with scheduled maintenance if performed by designated inspectors and proper documentation of inspection is performed. The annual control inspection can be considered as a safety inspection when accomplished at the specific period of the

required safety inspection. Safety inspection of crane trackage is not required due to the rigid support structure involved. If condition(s) prevail in the crane trackage that dictate the need for a more frequent inspection (see paragraph 2.5.2), a safety inspection program may be established.

2.3.1 Inspection Method. Track inspection shall be made on foot or in an on-track vehicle at a speed conducive to effective track inspection, but in no case to exceed 5 mph. Turnouts and rail crossings shall be inspected on foot.

2.3.2 Safety Inspection Records. The inspector shall complete and sign a Track Inspection Record on the day the inspection is made. Inspection records must specify track inspected, date of inspection, location and nature of newly discovered deviation from requirements and remedial action taken. Inspection reports which document deficiencies resulting in a track falling below its designated condition level shall be kept on file until all those deficiencies have been corrected. As a minimum, the inspection records shall be retained for at least one year after the inspection covered by the report. A blank example record is provided as Attachment (5). Instructions for completion and a sample filled in inspection report are provided in Appendix B of MO-103.9.

2.3.3 Schedule. Track shall be inspected at the interval determined from category of track and frequency of use in accordance with the following table. For track infrequently used, the safety inspection may be accomplished just prior to use. Track use should be looked at periodically (at least annually) to determine inspection frequency. Average use rates should be based on the previous six months use. If an inactive track is returned to use, inspection frequency will be established on expected use.

<u>Track Category</u>	<u>Types of Track and Use</u>
A	All active mainline track or other active track with speed greater than 10 mph
B	Active passing track, sidings, yard tracks, holding track or storage track
C	Active track with an average of 2 movements or less per month or inactive track with a mobilization mission
D	Inactive track. No current mobilization requirements

SAFETY INSPECTION SCHEDULE

Track Category	Traffic Frequency	Minimum Required Inspection Frequency
A	Mainline Track - Off-station (Note 1)	Weekly *
A & B	Two or more movements per week	Monthly *
A & B	Greater than one movement per month but less than two movements per week	Quarterly *
A, B & C	One movement or less per month	Semi-Annual *
D	None	Annual *

* Interval between inspections will be as follows:
Inspection Frequency Minimum Interval Between Inspections

Weekly	3 calendar days
Monthly	20 calendar days

Quarterly, semi-annual, and annual inspection will be accomplished in the month scheduled (i.e. Jan, Apr, Jul, Oct).

Note (1) Off-Station track is defined as that track belonging to the Navy that extends outside the main station through residential and/or commercial public areas. If track is infrequently used, safety inspection may be performed just prior to use.

2.4 CONTROL INSPECTION SUPPLEMENTED BY ENGINEERING EVALUATIONS.

Control Inspections are defined in MO-322, Volume I. Inspection checklists and guidelines are contained in MO-103, MO-103.9 and supplemented in this instruction. Control Inspections are to be conducted annually or more frequently when required by climatic conditions or other unusual circumstances. Annual inspection shall mean that sections of trackage are scheduled as part of the facilities inspection program in accordance with MO-322. Inspection for each track section shall be scheduled and accomplished during a specific month each year and routinely scheduled in a 12 month period. Annual inspection exceeding a 13 month period since the previous annual inspection on the particular track section will cause the existing certification to be default and result in the track section being non-certified for use. Engineering evaluations shall be conducted whenever there is any doubt of physical condition. In addition, Control Inspection or Engineering Evaluation criteria shall be used to supplement investigations and evaluations after any derailment. Additional testing or inspection shall be conducted when the condition of any portion of the trackage system is doubtful.

2.4.1 Visual Inspection. Visual inspections during the control inspection should include SM inspection checkpoints and observations of all trackage system components including rails, ties, rail accessories, switches, crossovers, ballast, roadbeds, support structures and appurtenances. Checkpoints for railroad trackage inspection are listed in MO-103, MO-103.9, MO-322 Volume II and FRA Track Safety Standards, Attachment (1).

2.4.1.1 Support Structures. All subgrades, ballast, foundations, and bridges or trestles shall be inspected for signs of settlement or failure. Special attention should be given to looking for openings in quaywalls, bulkheads or other waterfront retaining structures that may permit fill material to wash out and cause trackage settlement and failure. Bridges, trestles, and piers supporting ground level rail and buildings/support structures for elevated crane rail shall be inspected in accordance with criteria outlined in MO-322 and the following criteria. The prescribed minimum inspection frequency for buildings, bridges, and trestles is two years. In addition to the biennial inspection, supporting structures for elevated cranes shall be inspected when cranes are load tested to exceed the rated capacity of the system. This inspection maybe limited to only that portion of the support system affected by the load test. Inspection of the support system of the crane for both the biennial control inspection and crane load test inspection may be performed by facilities planner & estimators or inspectors or crane structural inspectors, as long as they meet the minimum inspection requirements of MO-322. Biennial support structure inspection reports shall be reviewed and random observations made of rail supports, connections, braces, and beam to column joints for indications of movement, deterioration, or stress. Broken and defective components shall be scheduled for repair or replacement. For wood, steel or concrete columns, beams, braces, girders and other structural members, indicators of settlement, misalignment or deflection shall be recorded. Deflection, movement, or settlement under routine in-service loading exceeding the limits shown in Attachments (2) or (3) shall be investigated and analyzed, the degree of damage documented, and the classification of hazard determined. Structural conditions leading to restricted certification of a section of trackage shall be based on a review of the structural analysis and on a condition survey conducted by competent engineers in sufficient detail to establish the safety of the structure.

2.4.1.2 Program for Inspection of Paved and Covered Areas

2.4.1.2.1 Paved Areas. Inspection of trackage encased in asphalt, concrete, grout or roadcrossing material shall include visual inspections and operational observations (para 2.4.2) for exposed rail defects, trackage movement, and signs of distress in adjacent pavement. **To verify visual inspections**, activities shall establish a program to remove small sections of asphalt and spot check trackage encased in pavement based on indication of defects with consideration taken for age and usage. Types of defects which would require pavement removal would include pumping joints, wide gage, deflecting rail, settlement of track and surrounding area. Rigidly supported (concrete or metal beam) ground level crane systems and flexibly supported (wood tie and ballast) railroad trackage systems should have separate programs. Because of the weight of portal cranes used in operational observations and the type of foundation existing, removal of pavement for investigation may be minimal or not required based on engineering judgment and Certifying Official approval.

Pavement shall be maintained so that it does not interfere with railroad or crane operation and to ensure safe vehicle movement.

2.4.1.2.2 Covered Areas. In areas where trackage systems (any portion of the track system from the top of the tie up) are covered with ballast, earth, coal or other material and where excess ballast or other material serves no functional purpose, it shall be removed to permit thorough and complete inspections. In areas where ballast or other material is installed to meet operational requirements, sufficient ballast shall be removed to spot check trackage. Spot checks shall be made of areas where suspected defects are indicated and at randomly selected points established by the certifying official based on time in service, usage, knowledge of track condition, and visual observations. At U. S. Naval shipyards, spot checks shall be made at randomly selected points such that a minimum of 5 percent of the covered portions of the trackage system shall be inspected each year. A representative portion of the tie plates, spikes, crossties, joints, rail and accessories shall be inspected each year. Ballast may be replaced to permit continuous operations.

2.4.1.2.3 Documentation. In order to document the inspection of trackage in paved and covered areas, an inspection report shall be prepared indicating defects noted, as well as description and general condition of track components for future reference. Pictures should be used to document conditions as necessary. Any defects detected affecting the certification of the section of trackage inspected shall be handled in accordance with paragraph 2.5.

2.4.2 Operational Inspection. The purpose of an operational inspection is to supplement the Control Inspection and to assist in the identification of problem areas which could develop into unsafe trackage. Conditions which may be discovered include the following:

- (1) Soft spots in the ballast.
- (2) Weak or disintegrated ties.
- (3) Looseness, binding or vibration.

2.4.2.1 Frequency. Operational inspections with loads prescribed in paragraph 2.4.2.3 shall be performed at intervals not to exceed two years on active trackage systems to ensure that the trackage systems will sustain the prescribed load in a safe manner. Railroad sidings, storage trackage and sections of crane or railroad trackage blocked or seldom used (less than six movements per year) shall have operational inspections within a maximum interval of five years. Operational inspection exceeding the two/five year requirement will cause the existing certification to be default and result in the track section being non-certified for use. All trackage serving hazardous loads, such as ordnance or fuel, shall have had an operational inspection within a period not to exceed two years.

2.4.2.2 Observations. A Track Inspector should conduct or supervise the operational inspection. Trackage shall be inspected during load test or while equipment is operating. Observations for looseness, binding, deflection, or vibration shall be made by sight, sound, and feel. In addition, rail joints, ties, tie plates, ballast or grout, general alignment, rail condition, supporting structures (see paragraph 2.4.1.1), and other accessories may be observed for deficiencies during and after the load

test or operational inspection. There is no requirement for physical measurements of rail or trackage systems under load; however, when practical and accessible, rail systems shall be observed for deflection. Guidelines for maximum allowable deflections as determined by visual judgment are shown on Attachments (2) and (3). In the event unusual movement is observed or felt, deflections appear to be larger than the guideline limits established, or the cause of deficiency cannot be immediately determined, an investigation and engineering analysis of the immediate vicinity shall be made prior to certification. Results of the investigation and engineering evaluation, not the deflection limit per se, shall determine when use of a section of trackage must be discontinued.

2.4.2.2.1 Long Sections. Observations of long sections of trackage not in congested industrial areas may be made (1) during routine annual inspections, (2) by operators in conjunction with daily safety checks, (3) by maintenance-of-way supervisor from the lead car or engine, or (4) by inspectors adjacent to the trackage. When the operational inspection is performed on board a train or engine, supplemental observations of passing rail traffic at randomly selected and suspected defective areas shall be made by an inspector walking alongside the trackage system.

2.4.2.2.2 After Repair. Operational Inspection for certification following major repair or reconstruction is not a mandatory action required by this instruction; however, as a minimum a visual observation of trackage under routine traffic loading during or after repair shall be performed to ensure proper movement. In addition, it is recommended that, when practical, in-house work orders and contract documents require compliance with the following procedures prior to final acceptance:

(1) Railroad Trackage Repair. Equipment shall be operated over railroad trackage after major repair or reconstruction and prior to final track surfacing to ensure there are no defects and to stabilize ballast, rail alignment and track surface. Whenever fill material is added and compacted, ties or rails are installed and aligned, preliminary tamping of ballast is completed, or other work is accomplished, the section of trackage involved shall be inspected for safety and compliance with specifications prior to conducting an operational inspection. Rail traffic shall be run over the repaired or reconstructed section several times. Following this operation, defects shall be corrected, the trackage shall be realigned and surfaced, and the ballast shall be retamped. After final track resurfacing, tamping and alignment, gage, elevations, profile, cross level, and other specifications shall be rechecked for compliance in accordance with acceptance criteria for trackage repair or construction (NOT LISTED IN THIS INSTRUCTION) prior to final acceptance, certification and routine operation. NFGS-05650 and MO-103.9 provide acceptance criteria which should be included in the contract specification.

(2) Crane Trackage Repair. Ground level crane trackage shall have a crane successfully operate over the system repaired prior to encasing in concrete.

2.4.2.3 Loads. Loads defined below should be moved over track systems slowly enough so that observations can be made.

2.4.2.3.1 Railroad Trackage. Loads on rails shall be provided by routine rail traffic that normally operates on the track. If a typical train is not observed, the load on the rail may be provided by a locomotive, engine or test car designated by the certifying official. When a test car is used, it shall be loaded to give the maximum anticipated load on at least one axle and as close to the total anticipated load as practical.

2.4.2.3.2 Ground Level Crane Trackage. Loading of cranes being certified is prescribed in NAVFAC P-307. For trackage systems not inspected during crane certification, an operational inspection shall be conducted by using the heaviest crane or the crane with the largest wheel load that can operate on the track. The inspection may be conducted with no load on the hook. The boom should be elevated to minimum radius when conducting the operational inspection; however, the boom may be parallel to the track except when a defect is suspected. (Note: With the boom elevated to its minimum radius, maximum loading and therefore observation of load is under the counterweight.) Where there is possibility of a crane wheel coming off the track or where there is the possibility of settlement, the maximum or minimum loading shall be created by positioning the boom relative to the trackage being tested.

2.4.2.3.3 Elevated Crane Trackage. Loads for crane certification and test procedures are prescribed in paragraph 6.2.3. Appendix E, NAVFAC P-307. Portions of elevated crane rail not inspected during crane certification shall be observed during the operation of the heaviest crane that can operate on the track with no load on the hook and the trolley positioned adjacent to the rail being observed. Trackage support systems shall be inspected after completion of the crane load test in accordance with paragraph 2.4.1.1.

2.4.3 Measurements. The Control Inspection shall include visual observations and spot check measurements of grade, track gage, cross section elevation, horizontal alignment, vertical mismatch, supports and other features to insure that criteria in this instruction are met. Instrument surveys may be requested by the certifying official or his representative to verify visual observations or spot check measurements, establish new alignment, investigate problem areas and determine deviation from the established standards.

2.4.4 Control Inspection Documentation

All inspections performed under paragraph 2.4 shall be properly documented. Inspection records must specify track inspected, date of inspection, location and nature of deviation from requirements and remedial action taken. Control inspection documentation should address all marginal, critical and catastrophic deficiencies existing in the track system at the time of inspection. In addition to detailing defects detected during the annual visual inspection, outstanding defects detected during safety inspections, operational inspections, non-destructive test inspection and other inspections and engineering investigations should be included. Deficiencies not exceeding marginal criteria are recorded, as necessary. As a minimum, the inspection records shall be retained for at least two years after the inspection covered by the report. A blank example record is provided as Attachment (5). Instructions for completion and a sample filled in inspection report are provided in Appendix B of MO-103.9. Attachment (6) provides a sample of a "Turnout Inspection Checklist" form. The

turnout inspection checklist is provided for use, but is not a required document. Instructions for completion and a sample filled in report are provided in Appendix B of MO-103.9.

2.5 CERTIFICATION. All trackage shall be certified according to one of the classifications shown herein. Certification shall be made and documented at intervals not to exceed two years. Inspection methods and tests described or referenced herein shall be used as the basis for trackage certification. At any time during the two year period of the certification, the annual visual or two/five year operational inspections become overdue, the certification will be cancelled in accordance with paragraph 2.5.3. At which time overdue inspection(s) are accomplished, certification/recertification will be in accordance with paragraph 2.5.3. Attachment (4) provides minimum requirements for a certification document and may be used; however, activities have the option to use locally developed forms. For inactive trackage or trackage used infrequently, certification may be performed just prior to use. When there is any doubt as to the degree-of-hazard over a given section of trackage, a certification shall not be given until a detailed investigation and engineering evaluation have been completed to determine whether or not the section of trackage involved can be certified safe, or whether or not restricted operations may continue pending repair.

2.5.1 Certifying Official. The Certifying Official shall:

- (1) Be designated, in writing, by the activity commanding officer as responsible for the maintenance and inspection of trackage. Alternate Certifying Official(s) may be designated, in writing by the activity commanding officer to act in the absence of the Certifying Official.
- (2) Approve all certifications.
- (3) Be responsible for safety and shall insure the visual supervision of each operation over the defective sections when necessary to use non-certified trackage.
- (4) Make a visual examination of the cause of non-certification to determine if the trackage can be used for emergency or temporary traffic.
- (5) Indicate, in writing, mandatory precautions and restrictions to be enforced when a section of restricted or non-certified trackage is used.
- (6) Delegate the authority to visually supervise movement on noncertified trackage, except for movement of hazardous or nuclear material, provided that defects have been examined to ensure they have not progressed or changed and that occasional movements can be made safely.

2.5.2 Certification Classifications

2.5.2.1 Full Certification. Trackage systems with minor deficiencies classified as "marginal" or no defect may be fully certified for all operations. These sections shall be repaired, when practical, during regularly scheduled track work operations. Records of unrepaired marginal rail defects and substandard trackage shall be kept current and the trackage continually observed during all future inspections to identify any further degradation which might result in "critical" defects.

2.5.2.2 Restricted Certification. Trackage systems with "Critical" rail defects (paragraph 3.2.2) or potentially dangerous sections of trackage may be scheduled for restricted operation at the discretion of the certifying official, provided FRA Trackage Safety Standards Paragraph 213.113 is complied with or all of the following actions are taken:

- (1) Replacement or repair is scheduled.
- (2) Deficient areas are clearly and specifically marked with warning signs when practical, or specified in written instructions and restrictions.
- (3) Operators are informed to proceed with extreme caution.
- (4) Reduced speed operation is approved following an engineering inspection.
- (5) Defect or defects are carefully reinspected during safety inspections at intervals prescribed by FRA or intervals of not more than every six months, whichever is less. (For infrequently used trackage, inspections may be made just prior to use.)

2.5.2.3 Non-Certification. Trackage systems which have "catastrophic" rail defects (paragraph 3.2.1) or dangerous sections of trackage shall not be certified. Usage shall be stopped until the section or sections of trackage have been repaired or replaced and certified. Emergency use of non-certified trackage is discussed in paragraph 2.5.1. Sections of trackage that are defective, damaged, misaligned or otherwise failing to meet the standards established in the FRA Track Safety Standards or this instruction shall be barricaded or marked with warning signs when practical and service shall be discontinued. When a catastrophic defect is found which cancels the certification of a specific section of track, service shall be discontinued over the defect and the problem area shall be isolated with barricades when practical. In addition to discontinuing service and isolating the problem area, the following actions shall be done to ensure maximum safety:

- (1) Advise all concerned.
- (2) When repaired, re-examine the specific section of trackage. An operational inspection is not a mandatory action. (See paragraph 2.4.2.2.2)
- (3) Recertify the repaired section. (See paragraph 2.5.3)

- (4) Update documentation to reflect defects, repair(s) made, reinspection, and recertification.

2.5.3 Cancelled Certification. Tests or inspections made between certifications that indicate previously unreported catastrophic defects, critical defects or other unsafe conditions shall automatically cancel certification over the specific section of trackage involved. The term "specific section" refers to the immediate area in which a defect occurs and not to the entire section of trackage certified. The certification of trackage on either side of such a defect may remain as classified at the discretion of the certifying official. If the new defect does not change the certification classification, the certification should not be changed. For example: If a critical defect is discovered in a section of trackage with restricted certification, the certification remains the same and is not cancelled. If the defect found would require a more restrictive certification than the entire section of trackage under certification, the certification over the specific section would change and appropriate actions, as discussed above, taken. This change in certification shall be documented and made known to the certifying official. The method used to remove the specific section of trackage from service is an activity option, provided all defects are recorded in history files and users of subject trackage are apprised of trackage defects and special precaution to take while using. Upon completion of investigation and temporary or permanent repairs, the specific section shall be reinspected. If the classification of certification is the same as for the entire section, the exception for the specific section involved may be cancelled and the original certification used.

2.5.4 Mobilization. Inactive trackage required for immediate mobilization should be maintained at a standard to meet FRA Class 1 Track Safety Standards (Restricted Certification). To support trackage required by M-day plus 30, an adequate stockpile of material (e.g. crossties) should be maintained to bring track up to FRA Class 2 Track Safety Standards, if necessary. Trackage required after M-day plus 30 requires minimum maintenance consisting of vegetation control, maintenance of adjacent drainage areas and maintenance of roadbed right-of-way free of encroachment by new facilities.

2.6 AUDIT. The appropriate Naval Facilities Engineering Command Field Division (EFD) shall schedule and conduct on site audits of maintenance management of trackage at each activity. Audits shall be scheduled at two-year intervals for activities handling nuclear or hazardous loads such as, but not limited to: LP gas, toxic chemicals, ordnance, and other materials that are explosive or environmentally dangerous. Audits shall be scheduled at four-year intervals for other activities. On site audits shall be conducted within three months of the scheduled interval. However, the EFD shall conduct audits more frequently when requested, when previous audits recommend additional follow-up, or when any audit reveals that the trackage maintenance management program at an activity is not satisfactory. The final audit reports on the effectiveness and adequacy of the program shall be forwarded to the activity and cognizant system command(s) within 45 calendar days after completion of the on site audit.

2.6.1 Purpose. The formal audit evaluates the effectiveness of the maintenance of trackage at each activity to ensure the safety and reliability of this facility and to furnish the activity and claimant with an appraisal of the track management program. The audit team shall review

procedures and make recommendations for improving maintenance management. Portions of the trackage system shall be inspected and results compared with the activities' inspections. The effort of the audit will be directed to affirm that the maintenance and certification programs are being conducted in a satisfactory manner and that activity instructions on implementation are adequate.

2.6.2 Activity Coordination. Schedules of audits will be coordinated with the activity to be audited and the activity formally notified. The activity's major claimant shall be advised of the dates that the audit will be conducted. Activities shall have the following records available for examination: mishap reports, inventory, maintenance and repair records, inspection reports, Annual Inspection Summary (AIS), certification documents and other related information. To establish credibility of documents involving inspections and tests, a technical representative from the track audit team should be present to observe a portion of the activity's operational and control inspections. In addition, the activities' inspectors shall accompany the track auditor during portions of the field examination. Activities shall ensure that all audit team findings are correct before the team members depart. In addition, the activity shall review preliminary recommendations and provide the audit team with reclaims or disagreements prior to the departure conference.

2.6.3 Audit Response. The activity audited shall forward a plan of action to its major claimant within 30 days after receipt of the audit report with a copy to the auditing EFD. In addition, responses of the corrective actions taken on the final audit report recommendations shall be submitted annually.

2.7 NON-DESTRUCTIVE TESTING (NDT). All active ground level crane, elevated crane and railroad rails shall be tested for defects upon activation and at five year intervals, unless maintenance problems or visual inspection dictate a necessity for more frequent testing. The term "upon activation" refers to sections of trackage which have been inactivated or not used and that have not had a non-destructive test within the preceding five years. All trackage that has not been non-destructively tested within the five year period from the previous NDT shall have a restricted certification or may be non-certified. Nondestructive testing of relay rail or used rail may be deferred until the next regularly scheduled five year test interval, at the discretion of the Certifying Official, however any such deferral should be based on an engineering evaluation that considers age, expected use, and experience. During the interim period, the rail may be given full certification based on other tests, observations, and inspections required by this instruction. Criteria for unacceptable rails are included in Attachments (2) and (3) and in MO-103.9. Appendix C, NAVFAC MO-103.9, provides a brief description and illustration of common rail defects. New rail and accessories shall be accepted according to the latest government specifications or standard industry practice. The NDT results shall be used to establish a base line for future inspection and to identify areas requiring observation.

2.7.1 Ultrasonic Testing. Ultrasonic inspection is a non-destructive test method for revealing internal discontinuities in dense homogenous materials by means of acoustic waves of frequencies above the audible range. Ultrasonic testing is the recommended method for non-destructive testing of readily accessible rail. Ultrasonic testing is an economical method of checking long lengths of trackage and rail encased in pavement. Generally ultrasonic testing of elevated crane rails is not required; however, elevated crane rails may be ultrasonically tested at the discretion of the certifying official.

2.7.1.1 Ultrasonic Equipment Operators. Operators of the ultrasonic equipment shall be certified to a Level II qualification in accordance with paragraph 3.3 of the American Standards Institute(ANSI)/American Society for Nondestructive Testing (ASNT) Standard CP189-1991 "ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel"

2.7.1.2 Ultrasonic Equipment. The ultrasonic equipment operated by qualified personnel (para. 2.7.1.1) shall be able to detect, but not be limited to, the following discontinuities in the rail.

Transverse fissures or other centrally located transverse defects representing approximately 10% of the cross-sectional area of the rail head.

Detail fractures representing approximately 15% of the cross-sectional area of the rail head and not masked from above by the shallow horizontal separations sometimes associated with shells.

Engine burn fractures or transverse separations developing from thermal cracks underneath the driver burns representing approximately 20% of the cross-sectional area of the rail head.

Horizontal split heads at least two inches in length, extending at least halfway through the rail head and located one-half inch or more below the running surface of the rail.

Vertical split heads so oriented as to interrupt an ultrasonic signal transmitted centrally through the rail section from above.

Head and web separations and split webs outside the joint bar limits at least two inches in length and progressing entirely through the rail web.

Joint defects (bolt hole cracks and head and web separations inside the joint bar limits) at least one-half inch in length and progressing entirely through the rail web.

Defective welds (plant or field) - with centrally located transverse defects, voids or inclusions in the rail head representing approximately 10% of the cross-sectional area of the rail head; with transverse head defects not centrally located representing approximately 15% of the cross-sectional area of the rail head; and with web defects in a generally horizontal plane at a rail weld approximately two inches in length or longer with penetration more than halfway through the rail web.

2.7.1.3 Calibration. Ultrasonic inspection equipment shall be calibrated to ensure reliable interpretation of responses. The approximate smallest indication that can be consistently detected include, but are not necessarily limited to, the following simulated, "marginal" defects.

- (1) A one-quarter (1/4) inch diameter hole drilled horizontally through the rail head.
- (2) A bolt hole through the web.
- (3) A horizontal one-half (1/2) inch long sawn crack between the head and the web.
- (4) A vertical one-half (1/2) inch long sawn crack in the web (optional depending on equipment available).

2.7.2 Sounding. Sounding with a hammer is one of the best and least expensive methods of testing rail, and is a practical way to inspect relatively short sections (1,000 feet or less) of ground level trackage, where it was impractical to perform an ultrasonic inspection or inaccessible during the ultrasonic inspection, elevated crane trackage and other trackage systems where ultrasonic testing is impractical. Light tapping with a 12 - 24 ounce steel hammer about every six inches will reveal looseness between rail and anchor plate, and defects before they become serious. Similar to ultrasonic testing, all non-standard responses should be investigated and recorded for future comparison. However, depending on rail usage, age, history, and experience, the activity shall determine, based on engineering analysis, an inspection schedule shorter than the programmed five year interval when using sounding as the non-destructive method.

2.7.3 Test Results. Rail inspection records must specify the date of inspection, the location and nature of any internal rail defect found, and the remedial action taken and the date thereof. Rail inspection records shall be retained until after the next rail inspection is performed or for one year after remedial action is taken, whichever is longer. All discontinuities shall be reported, the nature and size of defect estimated, and responses compared with standards or past test results. Rejection or degree-of-hazard of all potential defects shall be based on assessment of ultrasonic inspection results, visual inspection, experience, engineering judgment, the criteria shown in Attachment (2) or (3), and the FRA Track Safety Standards. In-place welded joints and welded repairs may have confused or erratic responses when ultrasonically tested; therefore, interpretation requires experience and engineering judgment to preclude an erroneous classification of defect.

2.7.4 Other Non-Destructive Tests. Magnetic particle (MILSTD 271), dye penetrant, and other non-destructive test methods may be advantageous in investigating potential defects indicated by other inspections. Eddy current, x-ray or other approved, non-destructive test methods brought about by state-of-the-art advances may be used to supplement ultrasonic testing or sounding based on local conditions, availability, economics, experience and engineering judgment.

2.8 MISCELLANEOUS INSPECTIONS AND TESTS. Other inspections may be used to determine the safe condition of trackage under unique or unusual circumstances or to make a detailed engineering investigation of specific, critical components of a trackage system. Prior to use, the availability, limitations and practicability of any special investigation shall be evaluated. Special inspections, such as the following, may assist in determining the condition of trackage.

2.8.1 Seismograph. Under certain conditions seismographic instruments may be beneficial in determining voids in fill material or embankments, level of water tables or location of slippage planes in the foundation below trackage systems.

2.8.2 Increment Bore. Timber trestles, piling and other wood structures should be examined for soundness when deterioration is suspected or when necessary to make an engineering analysis. In addition, this test may be required to help determine adequacy of treatment of new material.

2.8.3 Strain Gages. When the structural analysis for the anticipated maximum loading of a structure indicates certain members may be overstressed or marginal, a load test (duplicating or exceeding maximum total moment and shear experienced in-service) with stress and strain instrumentation is appropriate.

2.9 UNDERWATER INSPECTION. Underwater inspections of waterfront structures supporting crane or railroad trackage shall be conducted in accordance with guidelines contained in MO-104.2 Specialized Underwater Facilities Inspection, MO-311 Marine Biology Operational Handbook, and MO-322 Vol II Inspection of Shore Facilities. Inspections of piers, wharfs, quaywalls, and bulkheads shall include, but are not limited to: bearing or plumb piles, batter piles, pile caps, stringers, adjacent seawalls, riprap, sheet piling, abutments, and other subcomponents.

2.9.1 Frequency. Underwater and below deck inspections of support structures are required as follows:

- (1) At intervals not to exceed six years. In historically polluted waters which are being radically cleaned, all wood structures should be inspected every three years. An engineering analysis of each structure should be made to determine the appropriate inspection interval.
- (2) After obvious overload or structural damage
- (3) After a major storm.
- (4) Following a ship collision.

- (5) When recommended by other investigations, evaluations, and engineering judgment based on age of the structure, material condition, deterioration rate, biofouling growth, and suspected damage or deficiencies.

2.9.2 Assistance. The Naval Facilities Engineering Command will provide technical guidance, specifications, and assistance when requested for in-house or contract underwater inspections.

2.10 MISHAP INVESTIGATION. Activities shall investigate and keep records of all track systems involved in accidents reported to the Naval Safety Center and all trackage related incidents or minor mishaps including derailments, safety violations, personal injury, and property damage. Investigations and reporting shall be made in accordance with OPNAVINST 5102.1C, Mishap Investigation and Reporting, and OPNAVINST 5100.23D, Navy Occupational Safety and Health (NAVOSH) Program. Additional guidelines for detailed investigation of trackage systems are included in NAVFAC MO-103, Change 1. Completed mishap reports shall be forwarded to SOUTHNAVFACENGCOM (Code 164WG) within 30 days of mishap. Based on information learned from mishap reports, recommended maintenance and changed procedures to enhance mishap prevention shall be discussed at track conferences or distributed to all concerned. Investigation records shall include, but are not limited to:

- (1) Date and time.
- (2) Location and weather.
- (3) Description of event.
- (4) Type system and property involved.
- (5) Type of operation and speed.
- (6) Estimated cost of damage.
- (7) Reported injuries.
- (8) Track conditions.
- (9) Factors leading to mishap.
- (10) Corrective action(s) taken.
- (11) Investigators

SECTION 3. STANDARDS

3.0 The FRA Track Safety Standards, Attachment (1), Summary of Inspection Criteria, Attachments (2) and (3), and this section provide descriptions of tolerances and defects for guidance in deficiency classification. Deviation from the standards in the FRA Track Safety Standards or in this section may require immediate corrective action to provide for safe operations over the trackage involved. In addition, in accordance with paragraph 213.1 of the FRA Safety Standards, the requirements prescribed in the FRA Track Safety Standards and in Attachments (2) and (3) apply to specific track conditions existing in isolation. Therefore, a combination of track conditions, none of which individually amounts to a deviation from these requirements, may require remedial action to provide for safe operations over that track. In general, on heavily used sections of trackage, work planning should start when a deficiency on a section of trackage exceeds one-half (1/2) of the allowable deficiency so that repairs can be accomplished before deficiencies exceed the allowable standards for restricted certification. Additional maintenance standard guidance is provided in NAVFAC MO-103.9 "Railroad Trackage Field Assessment Manual". Selection, installation, inspection and maintenance of trackage systems shall be in accordance with documents referenced herein, except where criteria in this instruction provides more stringent or restrictive criteria. The summary of inspection criteria and defect classifications shown in Attachments (2) and (3) are guidelines establishing minimum standards allowed based on normal or average conditions.

3.1 TRACKAGE. The term "trackage" includes rails, ties, rail accessories, switches, crossovers, ballasts, roadbeds, support structures, subgrade, foundations, cut and fill slopes, ditches, road crossings, culverts, bridges, trestles, overpasses and underpasses, grade separations, tunnels, signals, snow protection, signs, and markings.

3.1.1 Railroad Trackage. In accordance with NAVFAC MO-103 and Department of Defense Standards, all military trackage systems shall be classified using the guidelines established by FRA standards. The FRA Track Safety Standards, attachment (1), provide minimum safety requirements that apply to specific track classifications. Changes or additions to the Safety Standards shall apply to Navy trackage when issued by the Federal Railroad Administration.

3.1.1.1 Railroad Classification. Paragraph 213.9 of the FRA Track Safety Standards establishes maximum operating speeds for Class 1 through 6 track based on requirements of the standards. Military railroad trackage systems are generally classified and maintained to Class 2 or better standards; however, if higher speeds are utilized, a corresponding higher classification with better standards may be assigned, provided that the section of track meets all requirements for that classification as shown in the FRA Track Safety Standards, Attachment (1). Activities establish speed limits based on industrial density, alignment restrictions, and other local requirements. Reduced maximum speed or slow orders do not reduce or change the track safety standard requirements or the FRA track class. If a section of track does not meet the standard in all requirements for Class 2 track, the section may be temporarily reclassified to a Class 1 track. Infrequently used, dead-end trackage, except trackage used to move nuclear or hazardous materials, may be permanently classified as Class 1 trackage. All Class 1 tracks shall have Restricted

Certification, see paragraph 2.5.2.2. Sections of trackage that do not meet the standards for Class 1 tracks shall have a "non-certification" status as described in paragraph 2.5.2.3.

3.1.1.2 Railroad Categories. Railroad Trackage systems are divided into six categories according to their principal use. Overall maintenance policies and detailed guidance for maintaining these categories are covered in MO-103 and MO-103.9.

<u>Railroad Categories</u>	
Category	Service or Use
Running or Access	Primary line, Industrial and Special Purpose
Classification Yard	Receiving, Sorting and Holding
Sidings	Auxiliary (other than for meeting or passing) and House Trackage (along or entering a building).
Team Tracks	Freight transferred directly to highway vehicles
Storage	Hold Purposes - Low use Spur
Temporary	Generally to facilitate construction

3.1.2 Crane Trackage. Crane Trackage is divided into two major systems - Ground Level and Elevated. Operating speeds for cranes shall be initiated and promulgated by Activity Commanders to meet local safety requirements. Categories may be assigned by type or limiting size of equipment utilizing the trackage system.

3.2 Trackage Defect Classification. Defect hazards are grouped into three categories - (1) Catastrophic, (2) Critical, and (3) Marginal. These categories are as recommended in MIL-STD 882C. Defects are listed in the hazard category in which they normally occur. Exceptions and variations are expected; therefore, experience or engineering judgment must be used to determine the degree of hazard for each defect. Guidelines to assist inspectors and certifying officials in determining the degree of hazard of a defect are described below and summarized in Attachments (2) and (3).

3.2.1 "Catastrophic". Sections of trackage with catastrophic defects involved shall not be used until repaired, except as noted in paragraph 2.5.2.3. Catastrophic defects include unsafe track conditions based on engineering judgment and experience, and defects requiring immediate change out of rail. The following defects are considered catastrophic and all traffic shall be stopped until repairs are made:

- (1) Any breakout in the railhead. (Exception as detailed in Note 6, Attachment (3), for crane rail.)
- (2) Rail defects accumulating three feet or more in any 10 feet.
- (3) Broken base exceeding six inches.
- (4) Any defect exceeding FRA Class 1 Track Safety Standards.

Specific criteria for evaluating the consequences of defects outside the range designated as critical for crane rail are not available. The activity shall evaluate the severity of each such defect and shall classify the degree-of-hazard based on engineering judgment and experience. Temporary or emergency repair of defective rails may reduce the degree-of-hazard to critical, marginal or no defect depending on the severity of the defect.

3.2.2 "Critical". Trackage with critical defects may continue in use provided that all actions addressed in paragraph 2.5.2.2 are complied with. Any defect exceeding FRA Class 2 Track Safety Standards are considered critical. Guidelines for classifying critical defects are provided in Attachments (2) and (3).

3.2.3 "Marginal". Marginal defects are deficiencies that will not cause damage to the trackage system or operating equipment, or endanger personnel safety and that should be scheduled for routine maintenance and repair. The intent in recording marginal or minor defects is to ensure that defects which may grow are monitored. In accordance with Note 8, Attachment (2) and Note 5, Attachment (3), certain internal rail defects may be categorized as marginal provided the defect is inspected six months after discovery and annually thereafter to ensure that the defect is not progressing.

3.3 RAIL. Standards for rail type, acceptable defects and replacement are discussed in this section and in paragraph 213.113 of the FRA Track Safety Standard, Attachment (1). The identification and terminology of different parts of a typical rail are shown in Appendix (C), MO-103.9.

3.3.1 Rail Type - General. In cases of individual rail replacement, where the existing rail does not meet the standard criteria listed herein and where the remaining track is performing satisfactorily, the same size rail may be installed. Rails must be connected at the joints so that the rails will act as a continuous girder with uniform surface and alignment.

3.3.1.1 Railroad. Existing rail, less than 115 pound rail for mainline and 90 pound for spurs and sidings, shall remain in service if performing satisfactorily. An engineering evaluation should be performed, if necessary, to determine if an upgrade to meet the standard criteria listed is required, based on age, condition and use (present and projected). The use of 115 pound AREA rail is recommended as a minimum for new installations and for major replacement projects. Heavier sections should be used when required by heavy loads or when necessary to meet minimum requirements of the serving railroad, especially if their locomotives are used on the activity track. For individual rail replacements, the same size as existing rail may be used. The use of 90 pound relay or used rail is recommended as a minimum on low use spurs. Requirements for minimum size

rail shall be in accordance with the latest issue of MIL-HDBK 1005/6, Chapter 1 "Railroad Trackage".

3.3.1.2 Ground Level Crane. A minimum of 135 CR rail is recommended when replacing or upgrading 132 pound rail in portal crane track systems. New portal crane systems should be designed considering larger crane rail sections to accommodate crane requirements. Other systems shall use rail specifically designed for the system. Welded joints shall be used whenever possible (see paragraph 3.3.3.2.).

3.3.1.3 Elevated Crane. The section of rail to be used is that which has been recommended by the crane manufacturer or the equivalent to the existing rail. Rail sections shall accommodate all crane wheels.

3.3.2 Rail Defects. The basic rule of thumb or general guideline for determining the acceptability of a defective rail for continuing use at U.S. naval activities is one-quarter (1/4) inch of alignment variation or movement. All irregularities in top or side rail wear, differences in elevation at breaks or joints, deflections, and movement exceeding 1/4 inch should be investigated. Common rail defects are illustrated and described in Appendix C, NAVFAC MO-103.9, described in Attachment (1) and categorized according to operational hazard or risk in Attachments (2) and (3). Maintenance and safety standards for rail defects, as well as remedial action, is provided in Chapter 7, MO-103.9.

3.3.3 Replacement. Defective rails shall be repaired or replaced according to NAVFAC MO-103 and MO-103.9, as necessary to meet certification criteria, or as required by the FRA Track Safety Standards.

3.3.3.1 Unwelded Rail. Remedial action for defective rail shall be in accordance with Chapter 7 and Table 7-2 of MO-103.9. The minimum "rail length", when installing new rail or repairing/replacing existing rail, is thirteen (13) feet. The existence of a short piece of rail (less than 13 feet) is not considered a defect. The existing rail should not be shorter than that necessary to allow for proper application of joint bars to adjoining rails on both ends and allow for proper alignment of rail. The condition of the track or defect in the rail would constitute a defect. There may be some instances where it may be economical to reduce the existing rail length; for example: replacing one rail length with two lengths of an old, standard rail before the entire section is replaced. This may be done provided the minimum length of thirteen (13) feet is maintained, and maximum lengths of rail are used when the section is upgraded. In some special cases such as short closure rails and short rails between turnouts and crossovers the rail length may be less than thirteen (13) feet provided only one piece of rail is used between the controlling features.

3.3.3.2 Welded Rail. In continuous welded rail, the standard minimum length of ten (10) feet shall be maintained between welds or joints. This length is required to ensure proper alignment of rails prior to welding. Existing shorter rail lengths between welds will be maintained as is. The thermite welding process per NAVFACENGCOM specification NFGS-05652 or a welding procedure approved by NAVFACENGCOMHQ should be used. Proper maintenance practice is to crop

(remove) the ends of rail with bolt holes prior to welding joints. Existing welded joints with bolt holes for joint bars in either piece of rail are considered no defect unless the weld or bolt holes contain critical defects. Existing rail holes, such as old gage rod holes, may be maintained as is, provided there are no other critical defects in the immediate area.

3.4 TRACK GEOMETRY. Horizontal alignment, vertical alignment (grade or profile), cross section elevation and gage shall be investigated when any of the following conditions exist:

- (1) There are indications of abnormal wear on the rail heads or on wheel flanges.
- (2) New rails are being installed or any portion of a rail is realigned.
- (3) Operating crane or railroad engine binds on trackage, has difficulty in starting or has trouble with movement.
- (4) When a potential deficiency of trackage can be observed, heard or felt.
- (5) There are indications of substructure settlement, failure or other structural changes.
- (6) Visual observations indicate that the acceptable limits may exceed those shown in Attachment (2) or (3).
- (7) Tests, inspection, experience or engineering judgment indicate operation or rail alignment problems.
- (8) Cranes roll after stopping.

3.4.1 Installation and Realignment. MIL-HDBK 1005/6 provides criteria for design and alignment of all trackage systems and shall be used for all new installations and major replacement projects. Existing systems, not conforming to grade and curvature standards, may be maintained as is, provided a record is on file describing each deviation from the standard and necessary operating restrictions are imposed. Restrictions shall be tailored to each specific situation and may include such items as maximum speed, use of auxiliary couplers and maximum car/engine combination. When major replacements are necessary, the new work shall comply with the grade, turnout and curvature standards outlined in MIL-HDBK 1005/6, or shall have an engineering justification and NAVFACENGCOMHQ approval on file for each deviation from the standard.

3.4.2 Horizontal Alignment. Maximum out of line limits for railroad trackage and tangent, ground-level crane trackage shall be according to those shown in Attachment (2) or (3).

3.4.2.1 Railroad Trackage. All curves shall have a designated degree(s) of curvature. Curves installed prior to November 1981 with radii less than 300 feet (19 degrees or larger) shall have approval by NAVFACENGCOMHQ on file as required by the previous issue of DM-5.6, October 1979. Single rail replacement may be made without obtaining a new approval; however, when replacing a section of trackage, new approval is required prior to awarding a contract or beginning in-house work. For all new construction or major rehabilitation projects with curves of less than 350 feet radius (16 degrees or larger), NAVFACENGCOMHQ approval shall be obtained as required by the current issue of MIL-HDBK 1005/6. The radius established by the activity is the base line, design, theoretical radius, or the radius that best fits the overall existing condition. Curved alignment that deviates from established uniformity more than the amount shown in Attachment (2) is considered defective. Spirals, as designated or as developed, shall have a smooth transition. The requirement to record the degree of curve is applicable only to railroad curves and does not apply to crane trackage. Crane trackage requires special design as discussed in paragraph 3.4.2.2.

3.4.2.2 Ground Level Crane Trackage. Horizontal rail alignment of curved crane trackage shall be analyzed when any of the conditions listed in paragraph 3.4 exist. The NAVFACENGCOM computer program entitled "TRACKS" is capable of analyzing portal crane float requirements for traversing curved track. This analysis of required float can be compared to the float capabilities of all cranes and will clearly define the problem areas. The problems may result in limited restriction of crane operation, reworking the running gear on the crane or realigning the trackage. It should be noted that the available design float of a crane may not necessarily be operational. The most appropriate solution will be the responsibility of the Certifying Official. To request assistance with the "TRACKS" Program, contact NAVFACENGCOMHQ.

3.4.2.3 Elevated Crane Trackage. Alignment of elevated crane trackage including stops shall be investigated and corrections made when any of the conditions listed in paragraph 3.4 exist.

3.4.3 Grade. Profile grades shown on Attachments (2) and (3) are the maximum allowable, except as noted below.

3.4.3.1 Railroad Trackage. Grades may be spot checked at random intervals with a hand level and rule. Switches may be installed on grade; however, no part of the switch should extend into a vertical curve or grade change.

3.4.3.2 Ground-Level Crane Trackage. On existing trackage with grades in excess of 1%, if cranes do not encounter acceleration or deceleration problems in traversing the tracks, no action is required. However, if problems are apparent or if other deficiencies dictate complete replacement of the track, the criteria of 1% maximum grade shall be followed. Curves, switches and frogs shall be on a near level grade in order to minimize the possibility of derailment. If existing grade is not level or if there is a difference in elevation between the inside rail and the outside rail, the position of the wheel flanges in relation to the top of the rail shall be observed to determine possible defective areas that may require a detailed engineering investigation. If wheel treads lift from the top of the rail, extreme caution must be taken during operations and immediate action initiated to correct the

deficiency. Inspectors should look for areas where wheels spin or try to climb the rail as opposed to normal rubbing. The area in question should be classified as critical and well marked so that all crane operators and crews will be cognizant of the deficiency.

3.4.3.3 Elevated Crane Trackage. The rail should be kept near level grade. The rail gradient must be kept below the slope that will cause the crane to roll freely and present problems in starting or stopping the crane.

3.4.4 Cross-Section Elevation. Vertical differences between rails shall be within the limits shown herein or in accordance with the FRA Track Safety Standards.

3.4.4.1 Railroad Trackage. On curved trackage in industrial areas traversed at low speeds, superelevation is not required. On curved trackage encased in pavement in industrial areas traveled at low speeds (10mph or less), the outside rail shall not be more than 1/2 inch lower (reverse superelevation) than the inside rail. For all other curved railroad trackage, the outside rail shall not be lower than the inside rail. Design elevation should be based on the degree of curvature and speed as shown in MIL-HDBK 1005/6. Maximum operating speeds shall be based on the 3-inch unbalanced formula in accordance with FRA "Track Safety Standards", paragraph 213.57(b).

3.4.4.2 Ground-Level Crane Trackage. When the difference in elevation between the elevation of the inside rail and the outside rail exceeds one inch the safety precautions discussed in paragraph 3.4.3.2 shall be made and appropriate action taken.

3.4.4.3 Elevated Crane Trackage. The cross-sectional difference in elevation of rails shall not exceed the limits established by the activity based on engineering judgment for each specific trackage system or the tolerance recommended by the manufacturer when known. Cross-sectional elevation differences should be checked when the conditions described in paragraph 3.4 exist.

3.4.5 Gage. Gage for railroad trackage is measured between the heads of the rails at right angles to the rails in a plane 5/8 inch below the top of the rail head. Gage for two rail crane trackage is measured center to center of railheads. Gage for four rail crane trackage systems is measured from the center points between the two sets of standard railroad tracks that comprise the system.

3.4.5.1 Railroad Trackage. The standard gage for railroad trackage is 4' - 8 1/2 inches except on sharper curves where the inside rail is widened to allow cars to track properly. The rate of change from standard to widened gage is 1/4 inch in 31 feet along the spiral curve or tangent adjacent to the curve, unless physical conditions do not permit the normal transition. The 1/4 inch in 31 feet rate of change from standard gage to widened gage for curves is a design standard and not trackage inspection criteria. Variations in gage within the limits shown on Attachment (2) are not a defect for Class 2 trackage, provided there are no alignment, surface, or foundation defects which would cause the train to start excessive or abnormal rocking or bouncing. Normally the average gage should not change between the minimum allowable and the maximum allowable, more than one time within two standard rail lengths. Specific criteria for "relatively uniform and constant" gage

transition is not available; therefore, the activity shall evaluate each suspected section and shall classify the degree-of-hazard based on engineering judgment and experience.

3.4.5.2 Ground Level Crane Trackage. The gage on curved trackage shall under no circumstances require more lateral float than the crane can provide. This can be analyzed using the NAVFACENGCOM computer program called "TRACKS" as described in paragraph 3.4.2.2.

3.4.5.3 Elevated Crane Trackage. The gage of trackage shall be held within the tolerances specified by the crane manufacturer or as computed from the existing crane wheel spacing. Gage of elevated crane trackage only needs to be measured when circumstances listed in paragraph 3.4 are not caused by other problems.

3.5 FROGS AND SWITCHES. Criteria for acceptable frogs and switches are shown in the FRA Track Safety Standards and Attachment (2) or (3). The maximum horizontal or vertical misalignment between the top or head of frog or switch rail and the stock rail is the same as for rail end mismatch; however, it is recommended that corrective action be taken in the vicinity of frogs and switches on running or access trackage before the critical limits are reached. Existing frogs and switches of types not recommended, which are performing satisfactorily, shall be retained. Replacement of frogs and switches shall be in accordance with MIL-HDBK 1005/6, MO-103 and the latest specifications.

3.5.1 Railroad Frogs. The identification and terminology of different parts of typical bolted rigid frogs for railroad trackage are shown in Chapter 8, MO-103.9. The use of number 4 or below frogs is prohibited by MIL-HDBK 1005/6 for new construction or major rehabilitation work. Standard rigid frogs are preferred; however, self guarded frogs may be used. Existing frogs number 4 or below and existing spring rail frogs should be replaced as soon as practicable and whenever the entire switch or turnout is being reworked. If the number 5 or larger frogs can not be used, design considerations and justification shall be submitted to NAVFACENGCOMHQ for approval prior to installation. When using standard rigid frogs, guard rails shall be installed to protect the frog point and assist in the prevention of derailments.

3.5.2 Ground Level Crane Trackage Frogs. The rigid frogs are preferred for all locations because of their maintenance free characteristics; however, the use of the turntable frog is mandatory for certain angles below 30 degrees, depending upon frog angle, curve radius, and flangeway width of crossing rail (see MIL-HDBK 1005/6 for details).

3.5.3 Railroad Trackage Switches. The identification and terminology of different parts of a typical switch are shown in Chapter 8, MO-103.9. For selection of proper switches, use MIL-HDBK 1005/6 or MO-103 manual criteria.

3.5.4 Ground-Level Crane Trackage Switches. The rail in some switches will "bow-up." This is a not a defect unless it causes binding or other difficulty in operation of the switch or the passing of a crane. Insure that ample flangeway is available in the vicinity of the point of switch and the stock rail, as controlled by flange width of crane wheels using the track system.

3.6 MISCELLANEOUS. Classification of defects listed in this section shall be made based on evaluation by the Activity and appropriate action shall be taken.

3.6.1 Tie Plates, Joint Bars, Angle Bars, Cleats and Other Accessories. Cracked, broken, loose or otherwise defective accessories that do not permit excessive rail movement and which meet the FRA acceptance criteria may be considered as no defect and repaired according to normal work schedules.

3.6.2 Safety Items. Safety features apply to all trackage systems and may also be included in the crane, building, or other inspection reports. There shall be no missing, loose or broken components, bad welds, accumulation of debris, heavy corrosion or severe deterioration of the following trackage appurtenances:

- (1) Ladders, Platforms and Hand Rails.
- (2) Rail Stops. (Rail stops are not required where local standards or engineering evaluation preclude use. i.e. rail stop in middle of road or paved area)
- (3) Guard Rails and Fences.
- (4) Crossing Signs and other warning signs or signals.
- (5) Any other features that could cause a mishap.

3.6.3 Bolts. Missing, broken, deteriorated or worn bolts which permit movement of rails 1/4 inch or less may be considered no defect, provided that the criteria in paragraph 213.121 of Attachment (1) are complied with. Track bolts should be oiled when installed and each time they are tightened. The recommended frequency for bolt tightening, for trackage not encased in pavement, is 3 months after installation and once a year after that, for railroad trackage and exposed ground level crane trackage, and once every two years after the three month tightening for elevated cranes. Tightening of loose bolts should be an ongoing task. Loosening of bolts is somewhat directly related to traffic and loading and may also be caused by defects; therefore, a more frequent program for bolt tightening and SM based on usage and experience may be required by the Certifying Official. It is conceivable that where there is a good SM and inspection program, annual tightening of all bolts may be unnecessary. Annual tightening of bolts in paved areas may be waived based on engineering judgment and provided that non-destructive test (paragraph 2.7), operational inspection (paragraph 2.4.2), and visual inspection in paved areas (paragraph 2.4.1.2) are satisfactory.

3.6.4 Spikes. Missing or loose spikes will cause a tie to be classified as defective (See paragraph 213.109 of Attachment (1)). The recommended number of track spikes per rail per tie for Class Two tracks is as follows:

- o Tangent Track and Curved Track with not more than 6° of Curvature (Radius 955 feet or larger) - TWO Spikes
- o Curved Track with less than 6° of Curvature (Radius 955 feet or larger) that has some superelevation and heavy loads operating at slow speeds - THREE Spikes

- o Curved Track with more than 6° of Curvature (Radius 955 feet or smaller) - THREE Spikes
- o Curved Track with more than 36° of Curvature (Radius less than 162 feet) that has superelevation or supports heavy loads - FOUR Spikes

3.6.5 Housekeeping. Keep trackage systems clear of obstructions that could cause derailment. Accumulations of debris, dirt, grease, paint, etc., shall be removed. Flangeways and switches shall be kept reasonably free of debris and silt.

3.6.6 Clearances. Impaired clearances shall be recorded and corrective actions taken to insure safety when the minimum clearances shown in MO-103, MO-103.9, or AREA Manual for Railway Engineering are violated. New encroachments should be reported by inspectors for further investigation and measurement.

3.7 SUBSTRUCTURE. Foundation deficiencies which upon failure could cause dropping, shifting, movement or derailment shall be considered critical or catastrophic.

3.7.1 Ballast. Ties shall be fully supported. Ties not fully supported are considered defective. Occasionally, heaving of track in the winter and spring will create deficiencies in track grade or rail levels. This usually indicates poor drainage, dirty ballast, inadequate subgrade or a combination of these conditions. Temporary corrections to this condition shall be accomplished so that the condition of trackage can be considered not defective. The use of track shims should be avoided; however, when shimming is necessary, it should be done in accordance with instructions outlined in NAVFAC MO-103. When weather conditions stabilize, appropriate corrective actions shall be taken to correct any deficiencies in ballast or subgrade.

3.7.2 Drainage. Lack of drainage is a major contributing factor in the cause and acceleration of defects. Water on, in, under or anywhere near trackage shall be controlled. Culverts, ditches and drains shall be kept open, freeflowing and in good repair.

3.7.3 Utility Lines. Utility lines passing under or adjacent to trackage should be noted on the plans and observed for signs of failure during all inspections. Ballast and subgrade do not have to be removed for inspection unless there is a suspected failure or defect in the distribution line or tunnel. Historical records of material and construction details shall be recorded and maintained when installed, repaired, or dug out for inspection.

3.8 CROSSTIES. The identification and terminology of different parts of a typical railroad crosstie system are shown in MO-103.9. Replacement ties should be adequately treated to ensure long, reliable life and to minimize replacement cost. New wood ties should be inspected as discussed in NAVFAC MO-312.2 and MO-103, Appendix G.

3.8.1 Tie Spacing. Tie quantity and spacing are based on roadbed conditions, trackage category, allowable wheel drop or bump in case of derailment, rail size, anticipated load and experience or engineering judgment. Installation criteria for new construction and rework trackage should be specified for each section of trackage based on current instructions, design standards, need and economics.

3.8.2 Skewed Ties. A skewed tie is one having an axis other than perpendicular to the rails (except turnout rails). Measurements of skew distance may be made while checking gage; however, a visual check at any trackage system is adequate. Spotting ties that are over half the width of the tie out-of-line can be easily done while walking or riding over the trackage system. Single skewed ties are not a defect. Sections of trackage with skewed ties indicate a problem area that should be investigated.

3.8.3 In-service Standards. Standards for crossties are described in Attachments (1) and (2). Variations from the summary of inspection criteria guidelines, Attachment (2), are expected, especially in the vicinity of switches.

SECTION 4. RECORDS

4.0 In order to manage and administer trackage inspections, maintenance programs, and design, the following information should be available in a usable condition so that it may be referred to easily and readily. Where documents do not exist, a program with milestones for establishing missing data should be initiated to obtain data on trackage systems. Generally, missing information is obtained simultaneously with repairing or upgrading sections of trackage. It is expected that the information required in this section will be obtained routinely with minimal disturbance of operations. Activity needs and priority for production and manpower should be considered prior to scheduling any survey work. In addition, track geometry information should be obtained when any of the conditions noted in Section 3.4 exist and when spot check measurements are required to verify the visual observations discussed in paragraph 2.4.3.

4.1 TRACK CHARTS. Track charts, plans, maps or plats shall be maintained as part of the real property records. They shall be kept up to date and used for programming future work, scheduling current work, indicating abnormal conditions and recording maintenance and inspection data. Track charts can be in any format, filed to suit activity needs, and shall be usable as a working document.

4.2 PLAN AND PROFILE. Detailed plan and top of rail profile or grades of crane and railroad track systems shall be kept current and may be shown on the track chart or separately. Size and type of rail, switches, degree of curvature for RR trackage alignment, frogs and other rail appurtenances should be indicated on the plan. Structures and other features which control or mandate alignment or grade, and reference points for location and elevation checks should be accurately referenced.

4.2.1 Top of Rail Profile. A detailed top of rail profile has a very low priority except where grades approach the allowable limits. In most cases the grade may be determined using a hand level and rod. The resulting estimated profile may be considered adequate until an accurate survey is required. A long range program to accomplish profile surveys is not required provided they are conducted when related problems are investigated or when new rail is installed.

4.2.2 Elevated Crane Rail Systems. The profile of elevated crane trackage may be considered level and the plan may be assumed to be a straight line provided the system alignment is straight and none of the conditions listed in paragraph 3.4 exist. A long range program to accomplish surveys is not required; however, when detailed surveys are conducted they shall be recorded.

4.2.3 Rail Identification. When rail is encased in pavement or otherwise unidentifiable, the size and type of rail should be estimated based on random uncovering or activities' experience. When positive identification cannot be made, that fact should be documented on the records. When an unidentified rail is repaired or replaced, the size and type of rail should be obtained and recorded on the plan or track chart and in the historical records file.

4.3 CROSS SECTION. Cross sections of substructures shall be maintained, when known and available, especially the substructures under crane or railroad tracks around piers, drydocks, trestles, wet areas and the major supporting substructures of elevated cranes.

4.4 HISTORICAL DATA. Historical data on each system shall be retained and shall include the following:

- (1) Dates that the system was installed.
- (2) Weight of rail, gage of track.
- (3) History of maintenance, repair, major replacement and realignment.
- (4) Replacement of rail and major tie replacement.
- (5) Methods of accomplishing previous work.
- (6) Design information, justification and background:
 - (a) Maximum capacity - where designs do not exist, load limits may be established based on engineering judgments and weight tests.
 - (b) Engineering calculations to establish maximum loading. When available, original or updated design calculations shall be maintained. When engineering analysis is not available, a statement describing the basis used to determine the maximum load limit should be included in the historical data.
 - (c) Valid structural analysis for all supporting structures based on or exceeding current maximum loading. Structural safety verification shall be on file for supporting substructures. As a minimum, especially for massive structures, an engineering certification based on visual observations, historical performance, and, when necessary, basic calculations on critical components should be available.
 - (d) For trackage encased in pavement, an accurate as-built description, certification or pictures shall be obtained. Tie spacing including number and pattern of spikes or tie down bolt spacing shall be verified.
- (7) NAVFACENGCOMHQ approval of railroad curves and turn-outs.
- (8) Justification or exceptions to standards (waivers).
- (9) Other pertinent information.

4.5 PROPOSED PROJECTS. Maintain a list of pending work including: major repair projects (approved, submitted and needed), minor work to be accomplished with local funding and major

replacement projects which are being considered for MCON funding. Use "multi-year" renewal programs for rail or tie replacement when practical.

4.6 SCHEDULED MAINTENANCE (SM) INSPECTION REPORTS. Local formats in existence may be used. As a minimum SM Inspection reports should include:

- (1) Date.
- (2) Sections of trackage inspected.
- (3) Corrected and uncorrected deficiencies.
- (4) Number of and size of broken or missing parts.
- (5) Suspected misalignment or defect.
- (6) Guides and instructions used for the inspection.

The current SM Inspection report and the one for the preceding period shall be retained. Work Authorization Documents or Shop Repair Orders, usually the action following SM Inspections, shall be kept for five years.

4.7 RAILROAD TRACK SAFETY INSPECTION REPORTS. Safety inspection records shall be retained for at least one year after the inspection covered by the report.

4.8 CONTROL INSPECTION AND ENGINEERING EVALUATIONS. As a minimum, activity track files shall contain the current and previous complete control inspection report. Engineering evaluations and all engineering investigation reports shall be retained until invalidated by trackage repair or other actions. Modification and alteration approvals including field checks shall be kept for five years. Current and previous operational inspection records shall be kept on file.

4.9 NON-DESTRUCTIVE TESTING. Current non-destructive test records shall be kept on file for all rails. Records shall be retained until after the next NDT is performed or for one year after remedial action is taken, whichever is longer. Data collected from the ultrasonic or induction tests shall be retained as necessary for base line and defect growth comparisons. A narrative report should be included to explain any unusual observations.

4.10 CERTIFICATION. All in-service trackage shall have a current certification, signed and dated by the Certifying Official. The latest certification for each section of trackage shall be readily available. Restrictions for restricted certification shall be documented and on file.

4.11 AUDIT REPORTS. The last audit, performed in accordance with paragraph 2.6, and activity responses shall be retained until superseded.

4.12 MISHAP REPORTS. Activities shall keep investigation records for all accidents and incidents related to trackage until data is verified during an audit review.

§ 212.235

(2) The ability to use electrical test equipment in direct current and alternating current circuits; and

(3) A basic knowledge of highway-rail grade crossing inspection and maintenance methods and procedures.

[59 FR 50104, Sept. 30, 1994]

§ 212.235 Inapplicable qualification requirements.

The Associate Administrator may determine that a specific requirement of this subpart is inapplicable to an identified position created by a State agency if it is not relevant to the actual duties of the position. The determination is made in writing.

[47 FR 41051, Sept. 16, 1982. Redesignated at 57 FR 28115, June 24, 1992. Further redesignated at 59 FR 50104, Sept. 30, 1994]

PART 213—TRACK SAFETY STANDARDS

Subpart A—General

Sec.

213.1 Scope of part.

213.3 Application.

213.4 Excepted track.

213.5 Responsibility of track owners.

213.7 Designation of qualified persons to supervise certain renewals and inspect track.

213.9 Classes of track: operating speed limits.

213.11 Restoration or renewal of track under traffic conditions.

213.13 Measuring track not under load.

213.15 Civil penalty.

213.17 Exemptions.

Subpart B—Roadbed

213.31 Scope.

213.33 Drainage.

213.37 Vegetation.

Subpart C—Track Geometry

213.51 Scope.

213.53 Gage.

213.55 Alinement.

213.57 Curves; elevation and speed limitations.

213.59 Elevation of curved track; runoff.

213.63 Track surface.

Subpart D—Track Structure

213.101 Scope.

213.103 Ballast; general.

213.109 Crossties.

213.113 Defective rails.

49 CFR Ch. II (10–1–96 Edition)

213.115 Rail end mismatch.

213.121 Rail joints.

213.123 Tie plates.

213.127 Rail fastenings.

213.133 Turnouts and track crossings generally.

213.135 Switches.

213.137 Frogs.

213.139 Spring rail frogs.

213.141 Self-guarded frogs.

213.143 Frog guard rails and guard faces; gage.

Subpart E—Track Appliances and Track-Related Devices

213.201 Scope.

213.205 Derails.

Subpart F—Inspection

213.231 Scope.

213.233 Track inspections.

213.235 Switch and track crossing inspections.

213.237 Inspection of rail.

213.239 Special inspections.

213.241 Inspection records.

APPENDIX A TO PART 213—MAXIMUM ALLOWABLE OPERATING SPEEDS FOR CURVED TRACK

APPENDIX B TO PART 213—SCHEDULE OF CIVIL PENALTIES

AUTHORITY: 45 U.S.C. 431 and 438, as amended; Pub. L. 100-342; and 49 CFR 1.49(m).

SOURCE: 36 FR 20336, Oct. 20, 1971, unless otherwise noted.

Subpart A—General

§ 213.1 Scope of part.

This part prescribes initial minimum safety requirements for railroad track that is part of the general railroad system of transportation. The requirements prescribed in this part apply to specific track conditions existing in isolation. Therefore, a combination of track conditions, none of which individually amounts to a deviation from the requirements in this part, may require remedial action to provide for safe operations over that track.

§ 213.3 Application.

(a) Except as provided in paragraph (b) of this section, this part applies to all standard gage track in the general railroad system of transportation.

(b) This part does not apply to track—

(1) Located inside an installation which is not part of the general railroad system of transportation; or

(2) Used exclusively for rapid transit service in a metropolitan or suburban area.

(Sec. 202, 84 Stat. 971 (45 U.S.C. 431); sec. 1.49(m) of the regulations of the Secretary of Transportation, 49 CFR 1.49(m))

[49 FR 1988, Jan. 18, 1984]

§ 213.4 Excepted track.

A track owner may designate a segment of track as excepted track provided that:

(a) The segment is identified in the timetable, special instructions, general order, or other appropriate records which are available for inspection during regular business hours;

(b) The identified segment is not located within 30 feet of an adjacent track which can be subjected to simultaneous use at speeds in excess of 10 miles per hour;

(c) The identified segment is inspected in accordance with § 213.233(c) at the frequency specified for Class 1 track;

(d) The identified segment of track is not located on a bridge including the track approaching the bridge for 100 feet on either side, or located on a public street or highway, if railroad cars containing commodities required to be placarded by the Hazardous Materials Regulations (49 CFR part 172), are moved over the track; and

(e) The railroad conducts operations on the identified segment under the following conditions:

(1) No train shall be operated at speeds in excess of 10 miles per hour;

(2) No revenue passenger train shall be operated; and

(3) No freight train shall be operated that contains more than five cars required to be placarded by the Hazardous Materials Regulations (49 CFR part 172).

[47 FR 39401, Sept. 7, 1982]

§ 213.5 Responsibility of track owners.

(a) Except as provided in paragraph (b) of this section, any owner of track to which this part applies who knows or has notice that the track does not

comply with the requirements of this part, shall—

(1) Bring the track into compliance;

(2) Halt operations over that track; or

(3) Operate under authority of a person designated under § 213.7(a), who has at least one year of supervisory experience in railroad track maintenance, subject to conditions set forth in this part.

(b) If an owner of track to which this part applies designates a segment of track as “excepted track” under the provisions of § 213.4, operations may continue over that track without complying with the provisions of subparts B, C, D, and E.

(c) If an owner of track to which this part applies assigns responsibility for the track to another person (by lease or otherwise), any party to that assignment may petition the Federal Railroad Administrator to recognize the person to whom that responsibility is assigned for purposes of compliance with this part. Each petition must be in writing and include the following:

(1) The name and address of the track owner;

(2) The name and address of the person to whom responsibility is assigned (assignee);

(3) A statement of the exact relationship between the track owner and the assignee;

(4) A precise identification of the track;

(5) A statement as to the competence and ability of the assignee to carry out the duties of the track owner under this part; and

(6) A statement signed by the assignee acknowledging the assignment to him of responsibility for purposes of compliance with this part.

(d) If the Administrator is satisfied that the assignee is competent and able to carry out the duties and responsibilities of the track owner under this part, he may grant the petition subject to any conditions he deems necessary. If the Administrator grants a petition under this section, he shall so notify the owner and the assignee. After the Administrator grants a petition, he

§ 213.7

may hold the track owner or the assignee or both responsible for compliance with this part and subject to penalties under § 213.15.

(e) A common carrier by railroad which is directed by the Interstate Commerce Commission to provide service over the track of another railroad under 49 U.S.C. 11125 is considered the owner of that track for the purposes of the application of this part during the period the directed service order remains in effect.

[47 FR 39402, Sept. 7, 1982]

§ 213.7 Designation of qualified persons to supervise certain renewals and inspect track.

(a) Each track owner to which this part applies shall designate qualified persons to supervise restorations and renewals of track under traffic conditions. Each person designated must have—

- (1) At least—
 - (i) One year of supervisory experience in railroad track maintenance; or
 - (ii) A combination of supervisory experience in track maintenance and training from a course in track maintenance or from a college level educational program related to track maintenance;
- (2) Demonstrated to the owner that he—

- (i) Knows and understands the requirements of this part;
- (ii) Can detect deviations from those requirements; and
- (iii) Can prescribe appropriate remedial action to correct or safely compensate for those deviations; and

(3) Written authorization from the track owner to prescribe remedial actions to correct or safely compensate for deviations from the requirements in this part.

(b) Each track owner to which this part applies shall designate qualified persons to inspect track for defects. Each person designated must have—

- (1) At least—
 - (i) One year of experience in railroad track inspection; or
 - (ii) A combination of experience in track inspection and training from a course in track inspection or from a college level educational program related to track inspection;

49 CFR Ch. II (10–1–96 Edition)

(2) Demonstrated to the owner that he—

- (i) Knows and understands the requirements of this part;
- (ii) Can detect deviations from those requirements; and
- (iii) Can prescribe appropriate remedial action to correct or safely compensate for those deviations; and

(3) Written authorization from the track owner to prescribe remedial actions to correct or safely compensate for deviations from the requirements of this part, pending review by a qualified person designated under paragraph (a) of this section.

(c) With respect to designations under paragraphs (a) and (b) of this section, each track owner must maintain written records of—

- (1) Each designation in effect;
- (2) The basis for each designation; and
- (3) Track inspections made by each designated qualified person as required by § 213.241.

These records must be kept available for inspection or copying by the Federal Railroad Administrator during regular business hours.

[36 FR 20336, Oct. 20, 1971, as amended at 38 FR 875, Jan. 5, 1973]

§ 213.9 Classes of track: operating speed limits.

(a) Except as provided in paragraphs (b) and (c) of this section and §§ 213.57(b), 213.59(a), 213.113(a), and 213.137 (b) and (c), the following maximum allowable operating speeds apply:

[In miles per hour]

Over track that meets all of the requirements prescribed in this part for—	The maximum allowable operating speed for freight trains is—	The maximum allowable operating speed for passenger trains is—
Class 1 track	10	15
Class 2 track	25	30
Class 3 track	40	60
Class 4 track	60	80
Class 5 track	80	90
Class 6 track	110	110

(b) If a segment of track does not meet all of the requirements for its intended class, it is reclassified to the next lowest class of track for which it does meet all of the requirements of this part. However, if the segment of

track does not at least meet the requirements for Class 1 track, operations may continue at Class 1 speeds for a period of not more than 30 days without bringing the track into compliance, under the authority of a person designated under §213.7(a), who has at least one year of supervisory experience in railroad track maintenance, after that person determines that operations may safely continue and subject to any limiting conditions specified by such person.

(c) Maximum operating speed may not exceed 110 m.p.h. without prior approval of the Federal Railroad Administrator. Petitions for approval must be filed in the manner and contain the information required by §211.11 of this chapter. Each petition must provide sufficient information concerning the performance characteristics of the track, signaling, grade crossing protection, trespasser control where appropriate, and equipment involved and also concerning maintenance and inspection practices and procedures to be followed, to establish that the proposed speed can be sustained in safety.

[36 FR 20336, Oct. 20, 1971, as amended at 38 FR 875, Jan. 5, 1973; 38 FR 23405, Aug. 30, 1973; 47 FR 39402, Sept. 7, 1982; 48 FR 35883, Aug. 8, 1983]

§213.11 Restoration or renewal of track under traffic conditions.

If during a period of restoration or renewal, track is under traffic conditions and does not meet all of the requirements prescribed in this part, the work on the track must be under the continuous supervision of a person designated under §213.7(a) who has at least one year of supervisory experience in railroad track maintenance. The term "continuous supervision" as used in this section means the physical presence of that person at a job site. However, since the work may be performed over a large area, it is not necessary that each phase of the work be done under the visual supervision of that person.

[47 FR 39402, Sept. 7, 1982]

§213.13 Measuring track not under load.

When unloaded track is measured to determine compliance with require-

ments of this part, the amount of rail movement, if any, that occurs while the track is loaded must be added to the measurement of the unloaded track.

[38 FR 875, Jan. 5, 1973]

§213.15 Civil penalty.

Any person (including a railroad, any manager, supervisor, official, or other employee or agent of a railroad, any owner of track on which a railroad operates, or any person held by the Federal Railroad Administrator to be responsible under §213.5(d)) who violates any requirement of this part or causes the violation of any such requirement is subject to a civil penalty of at least \$250 and not more than \$10,000 per violation, except that: Penalties may be assessed against individuals only for willful violations, and, where a grossly negligent violation or a pattern of repeated violations has created an imminent hazard of death or injury to persons, or has caused death or injury, a penalty not to exceed \$20,000 per violation may be assessed. Each day a violation continues shall constitute a separate offense. See appendix B to this part for a statement of agency civil penalty policy.

[36 FR 20336, Oct. 20, 1971, as amended at 53 FR 28598, July 28, 1988; 53 FR 52924, Dec. 29, 1988]

§213.17 Exemptions.

(a) Any owner of track to which this part applies may petition the Federal Railroad Administrator for exemption from any or all requirements prescribed in this part.

(b) Each petition for exemption under this section must be filed in the manner and contain the information required by §§211.7 and 211.9 of this chapter.

(c) If the Administrator finds that an exemption is in the public interest and is consistent with railroad safety, he may grant the exemption subject to any conditions he deems necessary. Notice of each exemption granted is published in the FEDERAL REGISTER together with a statement of the reasons therefor.

[36 FR 20336, Oct. 20, 1971, as amended at 48 FR 35883, Aug. 8, 1983]

Subpart B—Roadbed

§ 213.31 Scope.

This subpart prescribes minimum requirements for roadbed and areas immediately adjacent to roadbed.

§ 213.33 Drainage.

Each drainage or other water carrying facility under or immediately adjacent to the roadbed must be maintained and kept free of obstruction, to accommodate expected water flow for the area concerned.

§ 213.37 Vegetation.

Vegetation on railroad property which is on or immediately adjacent to roadbed must be controlled so that it does not—

- (a) Become a fire hazard to track-carrying structures;
- (b) Obstruct visibility of railroad signs and signals;
- (c) Interfere with railroad employees performing normal trackside duties;
- (d) Prevent proper functioning of signal and communication lines; or
- (e) Prevent railroad employees from visually inspecting moving equipment from their normal duty stations.

Subpart C—Track Geometry

§ 213.51 Scope.

This subpart prescribes requirements for the gage, alignment, and surface of track, and the elevation of outer rails and speed limitations for curved track.

§ 213.53 Gage.

- (a) Gage is measured between the heads of the rails at right-angles to the rails in a plane five-eighths of an inch below the top of the rail head.
- (b) Gage must be within the limits prescribed in the following table:

Class of track	The gage must be at least—	But not more than
1	4'8"	4'10"
2 and 3	4'8"	4'9¾"
4 and 5	4'8"	4'9½"
6	4'8"	4'9¼"

[36 FR 20336, Oct. 20, 1971, as amended at 47 FR 39402, Sept. 7, 1982]

§ 213.55 Alinement.

Alinement may not deviate from uniformity more than the amount prescribed in the following table:

Class of track	Tangent track—The deviation of the mid-offset from 62-foot line ¹ may not be more than—	Curved track—The deviation of the mid-ordinate from 62-foot chord ² may not be more than—
1	5"	5"
2	3"	3"
3	1¾"	1¾"
4	1½"	1½"
5	¾"	¾"
6	½"	¾"

¹ The ends of the line must be at points on the gage side of the line rail, five-eighths of an inch below the top of the railhead. Either rail may be used as the line rail, however, the same rail must be used for the full length of that tangential segment of track.

² The ends of the chord must be at points on the gage side of the outer rail, five-eighths of an inch below the top of the railhead.

§ 213.57 Curves; elevation and speed limitations.

- (a) Except as provided in § 213.63, the outside rail of a curve may not be lower than the inside rail or have more than 6 inches of elevation.
- (b) The maximum allowable operating speed for each curve is determined by the following formula:

$$V_{\max} = \sqrt{(E_a + 3) / 0.0007d}$$

where

V_{\max} = Maximum allowable operating speed (miles per hour).

E_a = Actual elevation of the outside rail (inches).

d = Degree of curvature (degrees).

Appendix A is a table of maximum allowable operating speed computed in accordance with this formula for various elevations and degrees of curvature.

§ 213.59 Elevation of curved track; runoff.

- (a) If a curve is elevated, the full elevation must be provided throughout the curve, unless physical conditions do not permit. If elevation runoff occurs in a curve, the actual minimum elevation must be used in computing the maximum allowable operating speed for that curve under § 213.57(b).
- (b) Elevation runoff must be at a uniform rate, within the limits of track surface deviation prescribed in § 213.63, and it must extend at least the full

length of the spirals. If physical conditions do not permit a spiral long enough to accommodate the minimum length of runoff, part of the runoff may be on tangent track.

§ 213.63 Track surface.

Each owner of the track to which this part applies shall maintain the surface of its track within the limits prescribed in the following table:

Track surface	Class of track					
	1	2	3	4	5	6
The runoff in any 31 feet of rail at the end of a raise may not be more than	3½"	3"	2"	1½"	1"	½"
The deviation from uniform profile on either rail at the midordinate of a 62-foot chord may not be more than	3"	2¾"	2¼"	2"	1¼"	½"
Deviation from designated elevation on spirals may not be more than	1¾"	1½"	1¼"	1"	¾"	½"
Variation in cross level on spirals in any 31 feet may not be more than	2"	1¾"	1¼"	1"	¾"	½"
Deviation from zero cross level at any point on tangent or from designated elevation on curves between spirals may not be more than	3"	2"	1¾"	1¼"	1"	½"
The difference in cross level between any two points less than 62 feet apart on tangents and curves between spirals may not be more than	3"	2"	1¾"	1¼"	1"	⅝"

Subpart D—Track Structure

§ 213.101 Scope.

This subpart prescribes minimum requirements for ballast, crossties, track assembly fittings, and the physical condition of rails.

§ 213.103 Ballast; general.

Unless it is otherwise structurally supported, all track must be supported by material which will—

(a) Transmit and distribute the load of the track and railroad rolling equipment to the subgrade;

(b) Restrain the track laterally, longitudinally, and vertically under dynamic loads imposed by railroad rolling equipment and thermal stress exerted by the rails;

(c) Provide adequate drainage for the track; and

(d) Maintain proper track cross-level, surface, and alignment.

§ 213.109 Crossties.

(a) Crossties shall be made of a material to which rail can be securely fastened.

(b) Each 39 foot segment of track shall have:

(1) A sufficient number of crossties which in combination provide effective support that will:

(i) Hold gage within the limits prescribed in § 213.53(b);

(ii) Maintain surface within the limits prescribed in § 213.63; and

(iii) Maintain alignment within the limits prescribed in § 213.55.

(2) The minimum number and type of crossties specified in paragraph (c) of this section effectively distributed to support the entire segment; and

(3) At least one crosstie of the type specified in paragraph (c) of this section that is located at a joint location as specified in paragraph (d) of this section.

(c) Each 39 foot segment of: Class 1 track shall have five crossties; Classes 2 and 3 track shall have eight crossties; Classes 4 and 5 track shall have 12 crossties; and Class 6 track shall have 14 crossties, which are not:

(1) Broken through;

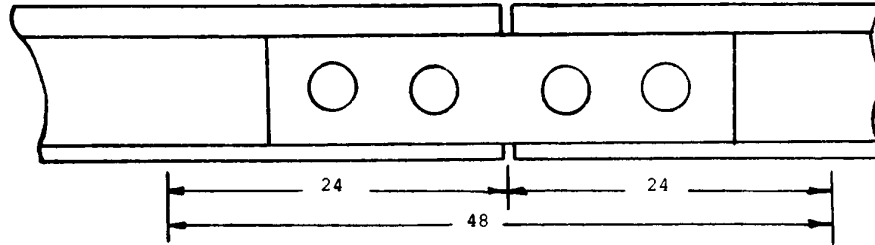
(2) Split or otherwise impaired to the extent the crossties will allow the ballast to work through, or will not hold spikes or rail fasteners;

(3) So deteriorated that the tie plate or base of rail can move laterally more than ½ inch relative to the crossties; or

(4) Cut by the tie plate through more than 40 percent of a tie's thickness.

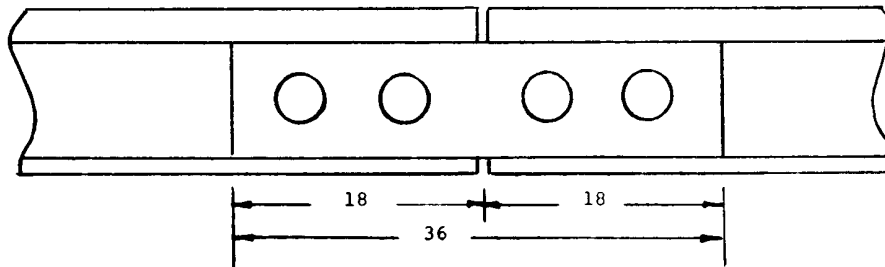
(d) Class 1 and Class 2 track shall have one crosstie whose centerline is within 24 inches of the rail joint location, and Classes 3 through 6 track shall have one crosstie whose centerline is within 18 inches of the rail joint location. The relative position of these ties is described in the following table.

Classes 1 and 2



Each rail joint in Classes 1 and 2 track shall be supported by at least one cross-tie specified in paragraph (c) of this section whose centerline is within the 48" shown above.

Classes 3 through 6



Each rail joint in Classes 3 through 6 track shall be supported by at least one cross-tie specified in paragraph (c) of this section whose centerline is within the 36" shown above.

[47 FR 39402, Sept. 7, 1982]

§ 213.113 Defective rails.

(a) When an owner of track to which this part applies learns, through inspection or otherwise, that a rail in

that track contains any of the defects listed in the following table, a person designated under § 213.7 shall determine whether or not the track may continue in use. If he determines that the track may continue in use, operation over the defective rail is not permitted until—

- (1) The rail is replaced; or
- (2) The remedial action prescribed in the table is initiated:

REMEDIAL ACTION

Defect	Length of defect (inch)		Percent of rail head cross-sectional area weakened by defect		If defective rail is not replaced, take the remedial action prescribed in note
	More than	But not more than	Less than	But not less than	
Transverse fissure	20 .....	.....	B.
	100	20	B.
		100	A.
Compound fissure	20 .....	.....	B.
	100	20	B.
		100	A.
Detail fracture	20 .....	.....	C.
Engine burn fracture	100	20	D.
Defective weld		100	A or E and H.
Horizontal split head	0	2	.....	.....	H and F.

REMEDIAL ACTION—Continued

Defect	Length of defect (inch)		Percent of rail head cross-sectional area weakened by defect		If defective rail is not replaced, take the remedial action prescribed in note
	More than	But not more than	Less than	But not less than	
Vertical split head	2 4	4	..... .....	..... .....	I and G. B.
Split web	(¹) 0	(¹) 1/2	(¹) .....	..... .....	A. H and F.
Piped rail	1/2	3	.....	.....	I and G.
Head web separation	3 (¹) 0	..... (¹) 1/2	..... (¹) .....	..... ..... .....	B. A. H and F.
Bolt hole crack	1/2 1 1/2 (¹)	..... ..... (¹)	..... ..... (¹)	..... ..... .....	G. B. A.
Broken base	0 6	6	..... .....	..... .....	E. A, or E and I.
Ordinary break .....	.....	.....	.....	.....	A or E.
Damaged rail .....	.....	.....	.....	.....	C.

¹ Break out in rail head.

AAAAANotes:

A. Assigned person designated under § 213.7 to visually supervise each operation over defective rail.

B. Limit operating speed over defective rail to that as authorized by a person designated under § 213.7(a), who has at least one year of supervisory experience in railroad track maintenance.

C. Apply joint bars bolted only through the outermost holes to defect within 20 days after it is determined to continue the track in use. In the case of Classes 3 through 6 track, limit operating speed over defective rail to 30 mph until angle bars are applied; thereafter limit speed to 60 mph or the maximum allowable speed under § 213.9 for the class of track concerned, whichever is lower.

D. Apply joint bars bolted only through the outermost holes to defect within 10 days after it is determined to continue the track in use. In the case of Classes 3 through 6 track, limit operating speed over the defective rail to 30 mph or less as authorized by a person designated under § 213.7(a), who has at least one year of supervisory experience in railroad track maintenance, until angle bars are applied; thereafter, limit speed to 60 mph or the maximum allowable speed under § 213.9 for the class of track concerned, whichever is lower.

E. Apply joint bars to defect and bolt in accordance with § 213.121 (d) and (e).

F. Inspect rail 90 days after it is determined to continue the track in use.

G. Inspect rail 30 days after it is determined to continue the track in use.

H. Limit operating speed over defective rail to 60 mph or the maximum allowable speed under § 213.9 for the class of track concerned, whichever is lower.

I. Limit operating speed over defective rail to 30 mph or the maximum allowable speed under § 213.9 for the class of track concerned, whichever is lower.

(b) As used in this section—

(1) *Transverse Fissure* means a progressive crosswise fracture starting from a crystalline center or nucleus inside the head from which it spreads outward as a smooth, bright, or dark, round or oval surface substantially at a right angle to the length of the rail. The distinguishing features of a transverse fissure from other types of fractures or defects are the crystalline center or nucleus and the nearly smooth surface of the development which surrounds it.

(2) *Compound Fissure* means a progressive fracture originating in a horizontal split head which turns up or down in the head of the rail as a smooth, bright, or dark surface progressing until substantially at a right angle to the length of the rail. Compound fissures require examination of both faces of the fracture to lo-

cate the horizontal split head from which they originate.

(3) *Horizontal Split Head* means a horizontal progressive defect originating inside of the rail head, usually one-quarter inch or more below the running surface and progressing horizontally in all directions, and generally accompanied by a flat spot on the running surface. The defect appears as a crack lengthwise of the rail when it reaches the side of the rail head.

(4) *Vertical Split Head* means a vertical split through or near the middle of the head, and extending into or through it. A crack or rust streak may show under the head close to the web or pieces may be split off the side of the head.

(5) *Split Web* means a lengthwise crack along the side of the web and extending into or through it.

(6) *Piped Rail* means a vertical split in a rail, usually in the web, due to

failure of the shrinkage cavity in the ingot to unite in rolling.

(7) *Broken Base* means any break in the base of a rail.

(8) *Detail Fracture* means a progressive fracture originating at or near the surface of the rail head. These fractures should not be confused with transverse fissures, compound fissures, or other defects which have internal origins. Detail fractures may arise from shelly spots, head checks, or flaking.

(9) *Engine Burn Fracture* means a progressive fracture originating in spots where driving wheels have slipped on top of the rail head. In developing downward they frequently resemble the compound or even transverse fissures with which they should not be confused or classified.

(10) *Ordinary Break* means a partial or complete break in which there is no sign of a fissure, and in which none of the other defects described in this paragraph are found.

(11) *Damaged Rail* means any rail broken or injured by wrecks, broken, flat, or unbalanced wheels, slipping, or similar causes.

[47 FR 39403, Sept. 7, 1982]

§ 213.115 Rail end mismatch.

Any mismatch of rails at joints may not be more than that prescribed by the following table:

Class of track	Any mismatch of rails at joints may not be more than the following—	
	On the trend of the rail ends (inch)	On the gage side of the rail ends (inch)
1	1/4	1/4
2	1/4	3/16
3	3/16	3/16
4, 5	1/8	1/8
6	1/8	1/8

§ 213.121 Rail joints.

(a) Each rail joint, insulated joint, and compromise joint must be of the proper design and dimensions for the rail on which it is applied.

(b) If a joint bar on classes 3 through 6 track is cracked, broken, or because of wear allows vertical movement of either rail when all bolts are tight, it must be replaced.

(c) If a joint bar is cracked or broken between the middle two bolt holes it must be replaced.

(d) In the case of conventional jointed track, each rail must be bolted with at least two bolts at each joint in classes 2 through 6 track, and with at least one bolt in class 1 track.

(e) In the case of continuous welded rail track, each rail must be bolted with at least two bolts at each joint.

(f) Each joint bar must be held in position by track bolts tightened to allow the joint bar to firmly support the abutting rail ends and to allow longitudinal movement of the rail in the joint to accommodate expansion and contraction due to temperature variations. When out-of-face, no-slip, joint-to-rail contact exists by design, the requirements of this paragraph do not apply. Those locations are considered to be continuous welded rail track and must meet all the requirements for continuous welded rail track prescribed in this part.

(g) No rail or angle bar having a torch cut or burned bolt hole may be used in classes 3 through 6 track.

§ 213.123 Tie plates.

(a) In classes 3 through 6 track where timber crossties are in use there must be tie plates under the running rails on at least eight of any 10 consecutive ties.

[36 FR 20336, Oct. 20, 1971, as amended at 47 FR 39404, Sept. 7, 1982]

§ 213.127 Rail fastenings.

Each 39 foot segment of rail shall have a sufficient number of fastenings which, in the determination of a qualified Federal or State track inspector, effectively maintain gage within the limits prescribed in § 213.53(b). The term *qualified State track inspector* as used in this section means a track inspector who meets the qualification requirements of 49 CFR 212.203. (Formerly § 212.75).

[47 FR 39404, Sept. 7, 1982]

§ 213.133 Turnouts and track crossings generally.

(a) In turnouts and track crossings, the fastenings must be intact and

maintained so as to keep the components securely in place. Also, each switch, frog, and guard rail must be kept free of obstructions that may interfere with the passage of wheels.

(b) Classes 4 through 6 track must be equipped with rail anchors through and on each side of track crossings and turnouts, to restrain rail movement affecting the position of switch points and frogs.

(c) Each flangeway at turnouts and track crossings must be at least 1½ inches wide.

[36 FR 20336, Oct. 20, 1971, as amended at 38 FR 876, Jan. 5, 1973]

§ 213.135 Switches.

(a) Each stock rail must be securely seated in switch plates, but care must be used to avoid canting the rail by overtightening the rail braces.

(b) Each switch point must fit its stock rail properly, with the switch stand in either of its closed positions to allow wheels to pass the switch point. Lateral and vertical movement of a stock rail in the switch plates or of a switch plate on a tie must not adversely affect the fit of the switch point to the stock rail.

(c) Each switch must be maintained so that the outer edge of the wheel tread cannot contact the gage side of the stock rail.

(d) The heel of each switch rail must be secure and the bolts in each heel must be kept tight.

(e) Each switch stand and connecting rod must be securely fastened and operable without excessive lost motion.

(f) Each throw lever must be maintained so that it cannot be operated with the lock or keeper in place.

(g) Each switch position indicator must be clearly visible at all times.

(h) Unusually chipped or worn switch points must be repaired or replaced. Metal flow must be removed to insure proper closure.

§ 213.137 Frogs.

(a) The flangeway depth measured from a plane across the wheel-bearing area of a frog on class 1 track may not be less than 1¾ inches, or less than 1½ inches on classes 2 through 6 track.

(b) If a frog point is chipped, broken, or worn more than five-eighths inch

down and 6 inches back, operating speed over the frog may not be more than 10 miles per hour.

(c) If the tread portion of a frog casting is worn down more than three-eighths inch below the original contour, operating speed over that frog may not be more than 10 miles per hour.

§ 213.139 Spring rail frogs.

(a) The outer edge of a wheel tread may not contact the gage side of a spring wing rail.

(b) The toe of each wing rail must be solidly tamped and fully and tightly bolted.

(c) Each frog with a bolt hole defect or head-web separation must be replaced.

(d) Each spring must have a tension sufficient to hold the wing rail against the point rail.

(e) The clearance between the hold-down housing and the horn may not be more than one-fourth of an inch.

§ 213.141 Self-guarded frogs.

(a) The raised guard on a self-guarded frog may not be worn more than three-eighths of an inch.

(b) If repairs are made to a self-guarded frog without removing it from service, the guarding face must be restored before rebuilding the point.

§ 213.143 Frog guard rails and guard faces; gage.

The guard check and guard face gages in frogs must be within the limits prescribed in the following table:

Class of track	Guard check gage—The distance between the gage line of a frog to the guard line ¹ of its guard rail or guarding face, measured across the track at right angles to the gage line, ² may not be less than—	Guard face gage—The distance between guard lines, ¹ measured across the track at right angles to the gage line, ² may not be more than—
1	4'6 1/8"	4'5 1/4"
2	4'6 1/4"	4'5 1/8"
3, 4	4'6 3/8"	4'5 1/8"

§ 213.201

Class of track	Guard check gage—The distance between the gage line of a frog to the guard line ¹ of its guard rail or guarding face, measured across the track at right angles to the gage line, ² may not be less than—	Guard face gage—The distance between guard lines, ¹ measured across the track at right angles to the gage line, ² may not be more than—
5, 6	4'6½"	4'5"

¹ Aline along that side of the flangeway which is nearer to the center of the track and at the same elevation as the gage line.

² Aline ⅝ inch below the top of the center line of the head of the running rail, or corresponding location of the tread portion of the track structure.

Subpart E—Track Appliances and Track-Related Devices

§ 213.201 Scope.

This subpart prescribes minimum requirements for certain track appliances and track-related devices.

§ 213.205 Derails.

(a) Each derail must be clearly visible. When in a locked position a derail must be free of any lost motion which would allow it to be operated without removing the lock.

[36 FR 20336, Oct. 20, 1971, as amended at 47 FR 39404, Sept. 7, 1982]

Subpart F—Inspection

§ 213.231 Scope.

This subpart prescribes requirements for the frequency and manner of inspecting track to detect deviations from the standards prescribed in this part.

§ 213.233 Track inspections.

(a) All track must be inspected in accordance with the schedule prescribed in paragraph (c) of this section by a person designated under § 213.7.

(b) Each inspection must be made on foot or by riding over the track in a vehicle at a speed that allows the person making the inspection to visually inspect the track structure for compliance with this part. However, mechanical, electrical and other track inspection devices may be used to supplement

49 CFR Ch. II (10–1–96 Edition)

visual inspection. If a vehicle is used for visual inspection, the speed of the vehicle may not be more than 5 miles per hour when passing over track crossings, highway crossings, or switches.

(c) Each track inspection must be made in accordance with the following schedule:

Class of track	Type of track	Required frequency
1, 2, 3	Main track and sidings.	<i>Weekly</i> with at least 3 calendar days interval between inspections, or <i>Before use</i> , if the track is used less than once a week, or <i>Twice weekly</i> with at least 1 calendar day interval between inspections, if the track carries passenger trains or more than 10 million gross tons of traffic during the preceding calendar year.
1, 2, 3	Other than main track and sidings.	<i>Monthly</i> with at least 20 calendar days interval between inspections.
4, 5, 6 .....	.....	<i>Twice weekly</i> with at least 1 calendar day interval between inspections.

(d) If the person making the inspection finds a deviation from the requirements of this part, he shall immediately initiate remedial action.

[36 FR 20336, Oct. 20, 1971, as amended at 40 FR 8558, Feb. 28, 1975]

§ 213.235 Switch and track crossing inspections.

(a) Except as provided in paragraph (b) of this section, each switch and track crossing must be inspected on foot at least monthly.

(b) In the case of track that is used less than once a month, each switch and track crossing must be inspected on foot before it is used.

§ 213.237 Inspection of rail.

(a) In addition to the track inspections required by § 213.233, at least once a year a continuous search for internal defects must be made of all jointed and welded rails in Classes 4 through 6 track, and Class 3 track over which passenger trains operate. However, in the case of a new rail, if before installation or within 6 months thereafter, it is inductively or ultrasonically inspected over its entire length and all

defects are removed, the next continuous search for internal defects need not be made until 3 years after that inspection.

(b) Inspection equipment must be capable of detecting defects between joint bars, in the area enclosed by joint bars.

(c) Each defective rail must be marked with a highly visible marking on both sides of the web and base.

[36 FR 20336, Oct. 20, 1971, as amended at 38 FR 876, Jan. 5, 1973]

§213.239 Special inspections.

In the event of fire, flood, severe storm, or other occurrence which might have damaged track structure, a special inspection must be made of the track involved as soon as possible after the occurrence.

§213.241 Inspection records.

(a) Each owner of track to which this part applies shall keep a record of each inspection required to be performed on that track under this subpart.

(b) Each record of an inspection under §§213.4, 213.233 and 213.235 shall

be prepared on the day the inspection is made and signed by the person making the inspection. Records must specify the track inspected, date of inspection, location and nature of any deviation from the requirements of this part, and the remedial action taken by the person making the inspection. The owner shall retain each record at its division headquarters for at least 1 year after the inspection covered by the record.

(c) Rail inspection records must specify the date of inspection, the location, and nature of any internal rail defects found, and the remedial action taken and the date thereof. The owner shall retain a rail inspection record for at least 2 years after the inspection and for 1 year after remedial action is taken.

(d) Each owner required to keep inspection records under this section shall make those records available for inspection and copying by the Federal Railroad Administrator.

[36 FR 20336, Oct. 20, 1971, as amended at 48 FR 35883, Aug. 8, 1983]

APPENDIX A TO PART 213—MAXIMUM ALLOWABLE OPERATING SPEEDS FOR CURVED TRACK
 Elevation of outer rail (inches)

Degree of curvature	0	1/2	1	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	5 1/2	6
Maximum allowable operating speed (mph)													
0°30'	93	100	107	109	103	109	109	106	110	104	107	110	101
0°40'	80	87	93	98	88	93	97	101	106	100	107	110	99
0°50'	72	78	83	88	80	85	89	93	96	89	93	96	87
1°00'	66	71	76	80	72	76	79	83	86	82	85	87	80
1°15'	59	63	68	72	66	69	72	76	79	73	76	78	71
1°30'	54	58	62	66	60	63	66	69	71	66	68	70	63
1°45'	50	54	57	61	55	58	61	64	67	61	63	65	58
2°00'	46	50	54	57	51	54	56	59	62	56	58	60	53
2°15'	44	47	50	54	48	51	54	56	59	53	55	57	50
2°30'	41	45	48	51	45	48	51	54	56	50	52	54	47
2°45'	40	43	46	48	42	45	47	49	51	45	47	49	42
3°00'	38	41	44	46	40	43	45	47	49	43	45	47	40
3°15'	36	39	42	45	38	41	43	45	47	41	43	45	38
3°30'	35	38	40	43	36	39	41	43	45	39	41	43	36
3°45'	34	37	39	41	35	37	39	41	43	37	39	41	34
4°00'	33	35	37	39	34	36	38	40	42	36	38	40	33
4°30'	31	33	35	37	32	34	36	38	40	34	36	38	31
5°00'	29	32	34	36	30	32	34	36	38	32	34	36	29
5°30'	28	30	32	34	29	31	33	35	37	31	33	35	28
6°00'	27	29	31	33	28	30	32	34	36	30	32	34	27
6°30'	26	28	30	32	27	29	31	33	35	29	31	33	26
7°00'	25	27	29	30	26	28	30	32	34	28	30	32	25
8°00'	23	25	27	28	24	26	28	30	32	26	28	30	23
9°00'	22	24	25	27	23	25	27	29	31	25	27	29	22
10°00'	21	22	24	25	22	24	25	27	29	24	26	28	21
11°00'	20	21	23	24	21	23	24	26	27	23	25	27	20
12°00'	19	20	22	23	20	22	23	24	26	22	24	26	19

[36 FR 20336, Oct. 20, 1971, as amended at 38 FR 876, Jan. 5, 1973]

Federal Railroad Administration, DOT

§ 214.1

APPENDIX B TO PART 213—SCHEDULE OF CIVIL PENALTIES¹

Section	Violation	Willful violation
Subpart A—General:		
213.4(a) Excepted track ² ...	\$2,500	\$5,000
213.4(b) Excepted track ² ...	2,500	5,000
213.4(c) Excepted track ² ...	2,500	5,000
213.4(d) Excepted track ² ...	2,500	5,000
213.4(e):		
1 Excepted track	5,000	7,500
2 Excepted track	7,000	10,000
32 Excepted track	7,000	10,000
213.7 Designation of qualified persons to supervise certain renewals and inspect track	1,000	2,000
213.9 Classes of track:		
Operating speed limits	2,500	5,000
213.11 Restoration or renewal of track under traffic conditions	2,500	5,000
213.13 Measuring track not under load	1,000	2,000
Subpart B—Roadbed:		
213.33 Drainage	2,500	5,000
213.37 Vegetation	1,000	2,000
Subpart C—Track geometry:		
213.53 Gage	5,000	7,500
213.55 Alignment	5,000	7,500
213.57 Curves; elevation and speed limitations	2,500	5,000
213.59 Elevation of curved track; runoff	2,500	5,000
213.63 Track surface	5,000	7,500
Subpart D—Track surface:		
213.103 Ballast; general ..	2,500	5,000
213.109 Crossties		
(a) Material used	1,000	2,000
(b) Distribution of ties ..	2,500	5,000
(c) Sufficient number of nondefective ties	1,000	2,000
(d) Joint ties	2,500	5,000
213.113 Defective rails	5,000	7,500
213.115 Rail end mismatch	2,500	5,000
213.121 (a) Rail joints	2,500	5,000
213.121 (b) Rail joints	2,500	5,000
213.121 (c) Rail joints	5,000	7,500
213.121 (d) Rail joints	2,500	5,000
213.121 (e) Rail joints	2,500	5,000
213.121 (f) Rail joints	2,500	5,000
213.121 (g) Rail joints	5,000	7,500
213.123 Tie plates	1,000	2,000
213.127 Track spikes	2,500	5,000
213.133 Turnouts and track crossings generally	1,000	2,000
213.135 Switches:		
(a) through (g)	2,500	5,000
(h) chipped or worn points	5,000	7,500
213.137 Frogs	2,500	5,000
213.139 Spring rail frogs	5,000	7,500
213.141 Self-guarded frogs	2,500	5,000
213.143 Frog guard rails and guard faces; gage	2,500	5,000
Subpart E—Track appliances and track-related devices:		
213.205 Derails	2,500	5,000
Subpart F—Inspection:		
213.233 Track inspections	2,000	4,000
213.235 Switch and track crossings inspections	2,000	4,000
213.237 Inspection of rail	2,500	5,000

APPENDIX B TO PART 213—SCHEDULE OF CIVIL PENALTIES¹—Continued

Section	Violation	Willful violation
213.239 Special inspections	2,500	5,000
213.241 Inspection records	1,000	2,000

¹ A penalty may be assessed against an individual only for a willful violation. The Administrator reserves the right to assess a penalty of up to \$20,000 for any violation where circumstances warrant. See 49 CFR part 209, appendix A.

² In addition to assessment of penalties for each instance of noncompliance with the requirements identified by this footnote, track segments designated as excepted track that are or become ineligible for such designation by virtue of noncompliance with any of the requirements to which this footnote applies are subject to all other requirements of part 213 until such noncompliance is remedied.

[53 FR 52924, Dec. 29, 1988]

PART 214—RAILROAD WORKPLACE SAFETY

Subpart A—General

Sec.

214.1 Purpose and scope.

214.3 Application.

214.5 Responsibility for compliance.

214.7 Definitions.

Subpart B—Bridge Worker Safety Standards

214.101 Purpose and scope.

214.103 Fall protection, generally.

214.105 Fall protection systems standards and practices.

214.107 Working over or adjacent to water.

214.109 Scaffolding.

214.111 Personal protective equipment, generally.

214.113 Head protection.

214.115 Foot protection.

214.117 Eye and face protection.

APPENDIX A TO PART 214—SCHEDULE OF CIVIL PENALTIES

AUTHORITY: 45 U.S.C. 431, 438, as amended; 49 CFR 1.49(m).

SOURCE: 57 FR 28127, June 24, 1992, unless otherwise noted.

Subpart A—General

§ 214.1 Purpose and scope.

(a) The purpose of this part is to prevent accidents and casualties to employees involved in certain railroad inspection, maintenance and construction activities.

**APPENDIX B TO PART 213—SCHEDULE OF
CIVIL PENALTIES¹—Continued**

Section	Violation	Willful violation
213.113 Defective rails	5,000	7,500
213.115 Rail end mismatch	2,500	5,000
213.121 (a) Rail joints	2,500	5,000
213.121 (b) Rail joints	2,500	5,000
213.121 (c) Rail joints	5,000	7,500
213.121 (d) Rail joints	2,500	5,000
213.121 (e) Rail joints	2,500	5,000
213.121 (f) Rail joints	2,500	5,000
213.121 (g) Rail joints	5,000	7,500
213.123 Tie plates	1,000	2,000
213.127 Track spikes	2,500	5,000
213.133 Turnouts and track crossings generally	1,000	2,000
213.135 Switches: (a) through (g) (h) chipped or worn points	2,500	5,000
213.137 Frogs	5,000	7,500
213.139 Spring rail frogs	5,000	7,500
213.141 Self-guarded frogs	2,500	5,000
213.143 Frog guard rails and guard faces; gage	2,500	5,000

Subpart E—Track appliances and track-related devices:		
213.205 Derails	2,500	5,000
Subpart F—Inspection:		
213.233 Track inspections	2,000	4,000
213.235 Switch and track crossings inspections	2,000	4,000
213.237 Inspection of rail	2,500	5,000
213.239 Special inspections	2,500	5,000
213.241 Inspection records	1,000	2,000

¹ A penalty may be assessed against an individual only for a willful violation. The Administrator reserves the right to assess a penalty of up to \$20,000 for any violation where circumstances warrant. See 49 CFR Part 209, Appendix A.

² In addition to assessment of penalties for each instance of noncompliance with the requirements identified by this footnote, track segments designated as excepted track that are or become ineligible for such designation by virtue of noncompliance with any of the requirements to which this footnote applies are subject to all other requirements of Part 213 until such noncompliance is remedied.

4.07 Train with a car required to be placarded in accordance with 49 CFR Part 172 operated over excepted track within 100 feet of a bridge or in a public street or highway.

7.01 No written record of names of qualified persons to supervise restorations and renewals of track under traffic and/or inspect track for defects.

7.02 Failure of track owner to provide written authorization to qualified designated individuals.

9.01 Failure to restore other than excepted track to compliance with Class 1 Standards within 30 days after a person designated under Section 213.7(a) has determined that operations may safely continue over defect(s) not meeting Class 1 Standard.

9.02 Failure of track owners to enforce over Class 1 defects the limiting conditions imposed by person designated under 213.7(a).

11.01 Proper qualified supervision not provided at work site during work hours when track is being restored or renewed under traffic conditions.

33.01 Drainage or water carrying facility not maintained.

33.02 Drainage or water carrying facility obstructed by debris.

33.03 Drainage facility collapsed.

33.04 Drainage or water carrying facility obstructed by vegetation.

33.05 Drainage or water carrying facility obstructed by silting.

33.06 Drainage facility deteriorated to allow subgrade saturation.

33.07 Uncontrolled water undercutting track structure or embankment.

37.01 Combustible vegetation around track carrying timber structures.

37.02 Vegetation obstructs visibility of railroad signs and fixed signals.

37.03 Vegetation obstructs passing of day and night signals by railroad employees.

37.04 Vegetation interferes with railroad

APPENDIX C

Defect Code	Description
4.01	Excepted track segment not identified in appropriate record.
4.02	Excepted track segment located within 30 feet of an adjacent track subject to simultaneous operation at speeds in excess of 10 mph.
4.03	Excepted Track not inspected in accordance with 213.233 (c) as specified for Class 1 track.
4.04	Train speed exceeds 10 mph on excepted track.
4.05	Revenue passenger train operated on excepted track.
4.06	Freight train operated on excepted track with more than five cars required to be placarded in accordance with 49 CFR Part 172.

- employees performing normal trackside duties.
- 37.05 Vegetation prevents proper functioning of signal and/or communication lines.
- 37.06 Excessive vegetation at train order office, depot, interlocking plant, carman's building etc., prevents employees on duty from visually inspecting moving equipment when their duties so require.
- 37.07 Excessive vegetation at train meeting points prevents proper inspection by railroad employees of moving equipment.
- 37.08 Excessive vegetation in toepaths and around switches where employees are performing normal trackside duties.
- 37.09 Vegetation brushing sides of rolling stock.
- 53.01 Gage dimension exceeds allowable for tangent track.
- 53.02 Gage dimension is less than allowable for tangent track.
- 53.03 Gage dimension exceeds allowable for curved track.
- 53.04 Gage dimension is less than allowable for curved track.
- 55.01 The alignment of tangent track exceeds the allowable deviation.
- 55.02 The alignment of curved track exceeds the allowable deviation.
- 57.01 Operating speed exceeds allowable, based on curvature and elevation.
- 63.01 Runoff in any 31 feet of rail at end of raise exceeds allowable.
- 63.02 Deviation from uniform profile on either rail exceeds allowable.
- 63.03 Deviation from designated elevation of spirals exceeds allowable.
- 63.04 Variation in cross level on spirals in any 31 feet exceeds the allowable.
- 63.05 Deviation from zero cross level at any point on tangent exceeds allowable.
- 63.06 Deviation from designated elevation on curves between spirals exceeds allowable.
- 63.07 Difference in cross level between any two points less than 62 feet apart on tangents exceeds allowable.
- 63.08 Difference in cross level between any two points less than 62 feet apart on curves between spirals exceeds allowable.
- 103.01 Insufficient ballast.
- 103.02 Fouled ballast.
- 109.01 Fewer than minimum allowable number of non-defective ties per 39 feet.
- 109.02 No effective support ties within the prescribed distance from a joint.
- 109.03 Crossties not effectively distributed to support a 39 foot segment of track.
- 113.01 Transverse fissure.
- 113.02 Compound fissure.
- 113.03 Horizontal split head.
- 113.04 Vertical split head.
- 113.05 Split web.
- 113.06 Piped rail.
- 113.07 Bolt hole crack.
- 113.08 Head web separation.
- 113.09 Broken base.
- 113.10 Detail fracture.
- 113.11 Engine burn fracture.
- 113.12 Ordinary break.
- 113.13 Broken or defective weld.
- 113.14 Damaged rail.
- 115.01 Rail end mismatch on tread of rail exceeds allowable.
- 115.02 Rail end mismatch on gage side of rail exceeds allowable.
- 121.01 Rail joint not of proper design or dimension.
- 121.02 Cracked or broken joint bar in Class 3 through 6 track (other than center break).
- 121.03 Cracked or broken (center break) joint bar.

- 121.04 Worn joint bar allows vertical movement of rail in joint in Class 3 through 6 track.
- 121.05 Less than two bolts per rail at each joint for conventional jointed rail in Class 2 through 6 track.
- 121.06 Less than one bolt per rail at each joint for conventional jointed rail in Class 1 track.
- 121.07 Less than two bolts per rail at any joint in continuous welded rail.
- 121.08 Loose joint bars.
- 121.09 Torch cut or burned bolt hole in joint bar in Class 3 through 6 track.
- 121.10 Torch cut or burned bolt hole in rail in Class 3 through 6 track.
- 123.01 Insufficient tie plates in Class 3 through 6 track.
- 127.01 Insufficient fasteners in a 39 foot track segment.
- 133.01 Loose, worn or missing switch clips.
- 133.02 Loose, worn or missing clip bolts (transit, side jaw, eccentric, vertical).
- 133.03 Loose, worn or defective connecting rod.
- 133.04 Loose, worn or defective connecting rod fastenings.
- 133.05 Loose, worn or defective switch rod.
- 133.06 Loose, worn or missing switch rod bolts.
- 133.07 Worn or missing cotter pins.
- 133.08 Loose or missing rigid rail braces.
- 133.09 Loose or missing adjustable rail braces.
- 133.10 Missing switch, frog or guard rail plates.
- 133.11 Loose or missing switch point stops.
- 133.12 Loose, worn or missing frog bolts.
- 133.13 Loose, worn or missing guard rail bolts.
- 133.14 Loose, worn or missing guard rail clamps, wedge, separator block or end block.
- 133.15 Obstruction between switch point and stock rail.
- 133.16 Obstruction in flangeway of frog.
- 133.17 Obstruction in flangeway of guard rail.
- 133.18 Insufficient anchorage to restrain rail movement.
- 133.19 Flangeway less than 1½ inches wide.
- 135.01 Stock rail not securely seated in switch plates.
- 135.02 Stock rail canted by overtightening rail braces.
- 135.03 Improper fit between switch point and stock rail.
- 135.04 Outer edge of wheel contacting gage side of stock rail.
- 135.05 Excessive lateral or vertical movement of switch point.
- 135.06 Heel of switch insecure.
- 135.07 Insecure switch stand or switch machine.
- 135.08 Insecure connecting rod.
- 135.09 Throw lever operable with switch lock or keeper in place.
- 135.10 Switch position indicator not clearly visible.
- 135.11 Unusually chipped or worn switch point.
- 135.12 Improper switch closure due to metal flow.
- 137.01 Insufficient flangeway depth.
- 137.02 Frog point chipped, broken or worn in excess of allowable.
- 137.03 Tread portion of frog worn in excess of allowable.
- 139.01 Outer edge of wheel contacting side of spring wing rail.
- 139.02 Toe of wing rail not fully bolted and tight.
- 139.03 Ties under toe or wing rail not solidly tamped.
- 139.04 Bolt hole defect in frog.
- 139.05 Head and web separation in frog.
- 139.06 Insufficient tension in spring to hold wing rail against point rail.

- | | | | |
|--------|--|--------|---|
| 139.07 | Excessive clearance between hold-down housing and horn. | 235.01 | Failure to inspect switches at required frequency. |
| 141.01 | Raised guard worn excessively. | 235.02 | Failure to inspect track crossings at required frequency. |
| 141.02 | Frog point rebuilt before restoring guarding face. | 237.01 | Failure to inspect rail for internal defects at required frequency. |
| 143.01 | Guard check gage less than allowable. | 237.02 | Failure of equipment to inspect rail at joints. |
| 143.02 | Guard face gage exceeds allowable. | 237.03 | Defective rail not marked properly. |
| 205.01 | Derail not clearly visible. | 239.01 | Failure to make special inspections when required. |
| 205.02 | Derail operable when locked. | 241.01 | Failure to keep records as required. |
| 205.04 | Improper size derail. | 241.02 | Failure of inspector to complete report at time of inspection. |
| 205.05 | Improperly installed derail. | 241.03 | Failure of inspector to sign report. |
| 205.06 | Loose, worn or defective parts of derail. | 241.04 | Failure of inspector to provide required information. |
| 233.01 | Track inspected by other than qualified designated individual. | 241.05 | Failure of rail inspection record to provide required information. |
| 233.02 | Track being inspected at excessive speed. | 241.06 | Failure to make record available for copying and inspection. |
| 233.03 | Failure to inspect at required frequency. | | |
| 233.04 | Failure to initiate remedial action for deviations found. | | |

REB

(202) 366 9106

July 27, 1999

Washington, D.C.

Federal Railroad Administration

SUMMARY OF IN-SERVICE RAILROAD TRACKAGE INSPECTION CRITERIA

FRA Paragraph	TRACK SAFETY STANDARDS	DEFECTS			MO-103.9 Railroad Trackage Assessment Manual	INSTRUCTION Reference
		MARGINAL	CRITICAL	CATASTROPHIC		
"A" 213.9	<u>GENERAL</u> Speed		See Note 1 & 2 over 25 MPH			1.0 and 3.0 2.5.2 and 3.1.1.1
213.13	<u>OPERATIONAL TEST DEFLECTION</u> Flexible Support (wood ties and gravel ballast)	Note 2	over 1 1/2 inches see Note 3	Over 3 inches	3-1	2.4.2 2.4.2.2
	Rigid Support (concrete beam or slab - incl. bridges, trestles and buildings)	Note 2	over 1/2 inch See Note 3	Over 3 inches		2.4.2 and 2.4.1.1
"B" 213.33	<u>ROADBED</u> Drainage	obstruction to flow	blocked See Note 2	See Note 2	3-2	3.7.2
"C" 213.53	<u>TRACK GEOMETRY</u> <u>Gage</u>	<u>Under</u> 56 1/8" <u>Over</u> 57 1/2"	<u>Over</u> 57 3/4"	<u>Under</u> 56' <u>Over</u> 58"	12-2	3.4.5 3.4.5.1
213.55	<u>Alignment</u> (per 62') Tangent, Mid-Offset	over 1 3/4"	over 3 inches	over 5 inches	12-6	3.4.2 3.4.2.1
	Curve, Mid-Ordinate	over 1 3/4"	over 3 inches	over 5 inches	None	3.4.2.1
213.57	<u>Profile</u> Grade	See Note 2	more than 3%	See Note 2	None	3.4.3
	<u>Curve elevation</u> Outside rail on industrial trackage	See Note 2	over 3 inches See Note 4	See Note 2	12-4	3.4.4 3.4.4.1
	Reverse Superelevation on paved industrial trackage	over 1/4 inch	over 1/2 inch	See Note 2		3.4.4.1

SUMMARY OF IN-SERVICE RAILROAD TRACKAGE INSPECTION CRITERIA

FRA Paragraph	TRACK SAFETY STANDARDS	DEFECTS			MO-103.9 Railroad Trackage Assessment Manual	INSTRUCTION Reference
		MARGINAL	CRITICAL	CATASTROPHIC		
213.57	<u>Curve elevation</u> Cont'd Reverse Superelevation - All track less paved industrial track	See Note 2	less than 0	See Note 2	12-4.b	3.4.4.1
	Superelevation - based on degree of curvature and speed	2-inch unbalanced formula, MO- 103.9, Table 12-2	3-inch unbalanced formula, FRA	See Note 2	12-4.f	3.4.4.1
213.63	<u>Trackage Surface</u>					
	Runoff per 31 feet	over 1 1/2"	over 3"	over 3 1/2"	None	3.4.3.1
	Profile @ Mid-ordinate of 62' chord	over 2"	over 2 3/4"	over 3"	12-7	3.4.3.1
	Deviation from design on spiral elevation	over 1"	over 1 1/2"	over 1 3/4"	None	3.4.4.1
	Cross level variation per 31' on spirals	over 1"	over 1 3/4"	over 2"	None	3.4.4.1
	Cross level deviation	over 1 1/4"	over 2"	over 3"	12-3	3.4.4
	Cross level difference in 62 feet	over 1 3/4"	over 2"	over 3"	12-5	3.4.3.1 and 3.4.4
"D"	<u>TRACK STRUCTURES</u>					
213.103	Ballast	Track moves laterally, longitudinally or vertically. See track geometry	See Note 2	See Note 2	4-1	3.7.1

SUMMARY OF IN-SERVICE RAILROAD TRACKAGE INSPECTION CRITERIA

FRA Paragraph	TRACK SAFETY STANDARDS	DEFECTS			MO-103.9 Railroad Trackage Assessment Manual	INSTRUCTION Reference
		MARGINAL	CRITICAL	CATASTROPHIC		
213.109	<u>Crossties</u> <u>Quantity</u> - number per 39' of trackage	Less than 20	Less than 18	See Note 2	5-4 5-4.d	3.8 3.8.3
	<u>Spacing</u> - Face to face distance between two ties	see Note 2	over 18 inches see Note 5	See Note 2	5-4.d	3.8.1
	<u>Skew</u> - Deviation of ties from right angles to rails	3 or more con- secutive ties skewed greater than 8".	over 8" or standard tie width. See Notes 3, 5 and 7	See Note 2	5-4.f	3.8.2
	<u>Condition</u> Number of sound ties per 39 feet	Less than 12.	Less than 8. See Notes 6 and 7.	Less than 5	5-4.c	3.8.3
	<u>Consecutive defective ties</u> - See Note 6 Tangent and curves less than 6°	3	4	5 or more	5.4.c.(1)	3.8.3
	Curves greater than 6°	2	3	4 or more		
	<u>Joint ties</u> - required number of sound ties	Less than 2 sound ties within 24" of joint.	-----	No sound ties within 24" of joint.	5-4.c	3.8.3
213.123	<u>Tie Plates</u>	Indication of more than 1/2 " of movement. See Note 7.	See Note 2	See Note 2	5-2.c	None
213.127	<u>Rail Fastenings</u> - Spikes per rail per tie on tangent	Less than 2. See Note 5.	See Note 2 & 5	See Note 2 & 5	6-3	3.6.4
	on curves over 6°	Less than 3. See Note 5.	See Note 2 & 5	See Note 2 & 5		

SUMMARY OF IN-SERVICE RAILROAD TRACKAGE INSPECTION CRITERIA

FRA Paragraph	TRACK SAFETY STANDARDS	DEFECTS			MO-103.9 Railroad Trackage Assessment Manual	INSTRUCTION Reference
		MARGINAL	CRITICAL	CATASTROPHIC		
213.133	<u>Defective Rails</u> Transverse Fissure Compound Fissure Detail Fracture Engine Burn Fracture Ordinary Break	10% - 20% of railhead weakened by defect.	More than 20% of railhead weakened by defect. See Notes 2 & 8	Breakout in the railhead	7 & Appendix C Table 7-1	3.3.2
	Defective Weld	10% - 20% of railhead weakened by defect.	More than 20% of railhead weakened by defect.	Breakout in the railhead	Table 7-1	
	Horizontal Split Head Vertical Split Head	1" - 4" in length	More than 4" See Note 2 & 8	Breakout in the railhead	Table 7-1	
	Split Web Piped Rail Head Web Separation	1" - 3" in length	More than 3" See Note 2 & 8	Defects accum- ulating 3 feet or more in any 10 feet.		
	Bolt Hole Cracks	1/2" - 1 1/2" in length	More than 1 1/2" See Note 8	Breakout in the railhead	Table 7-1	
	Broken Base	0" - 6" in length	See Notes 2 & 8	Exceeding 6"	Table 7-1	
213.113	<u>Damaged Rail</u> Shelling, Head Checks, Engine Burns, Mill Defect Flaking-Slivered Corrugated-Corroded	Depth over 1/4"	Depth over 3/8"	See Note 2	Table 7-1	3.3.2

SUMMARY OF IN-SERVICE RAILROAD TRACKAGE INSPECTION CRITERIA

FRA Paragraph	TRACK SAFETY STANDARDS	DEFECTS			MO-103.9 Railroad Trackage Assessment Manual	INSTRUCTION Reference
		MARGINAL	CRITICAL	CATASTROPHIC		
213.113	<u>Damaged Rail</u> Cont'd Flowed Rail	Exceeding 3/16" from gage face.	Exceeding 5/16" from gage face.	See Note 2	7 & Appendix C Table 7-1	3.3.2
None	<u>Worn Rail</u> Web-Base Thickness Reduction Vertical head Wear: <u>Rail Section</u> (lbs per yard) up to 90 lb 100 lb - 119 lb above 119 lb Horizontal Side Wear <u>Rail Section</u> (lbs per yard) up to 90 lb 100 lb - 119 lb above 119 lb	See Note 2 3/8" 3/8" 1/2" 3/8" 1/2" 5/8"	Over 1/8" Over 3/8" Over 3/8" Over 1/2" See Note 10 Over 1/2" Over 5/8" Over 3/4"	See Note 2 See Note 2	7-1.c	3.3.3
213.115	<u>Rail End Mismatch</u> On tread or running surface On gage side	over 1/8 inch over 1/8 inch	----- over 3/16 inch	over 1/4 inch over 1/4 inch	6-4.f	None

SUMMARY OF IN-SERVICE RAILROAD TRACKAGE INSPECTION CRITERIA

FRA Paragraph	TRACK SAFETY STANDARDS	DEFECTS			MO-103.9 Railroad Trackage Assessment Manual	INSTRUCTION Reference
		MARGINAL	CRITICAL	CATASTROPHIC		
213.121	<u>Joints</u> Joint gap	over 3/4 inch See Note 9	over 1 1/4" See Note 9	See Note 2	6-4.g	3.6.1
	Bolt holes - torched or burned	Not allowed	Not allowed	See Note 2	6-4.a	None
	Joint bars	Any crack or break	---	any crack or break btwn the middle two bolt holes	6-4.c	None
	Track Bolts	None missing	less than two per rail	less than one per rail	6-4	3.6.3
213.133	<u>Turnouts and Crossings</u> Flangeway Width	1 5/8"	less than 1 5/8"	less than 1 1/2"	Table 8-1	3.5
213.135	<u>Switches</u> Point Closure Gap	over 1/8 inch	over 1/4 inch	See Note 2	8-3 Fig 8-1 & 8-3	3.5.3
	Point Condition	Broke/worn greater than 1/2" down & 6" back from point	Unusually, chipped, worn or flowed	See note 2		
213.137	<u>Frogs</u> Flangeway depth	1 1/2"	less than 1 1/2" See Note 11	less than 1 3/8"	8-4	3.5.1
	Point	more than 1/2" down and 6" back	more than 5/8" down and 6" back	See Note 2		
	Tread Wear	more than 5/16"	more than 3/8"	See Note 2		

SUMMARY OF IN-SERVICE RAILROAD TRACKAGE INSPECTION CRITERIA

FRA Paragraph	TRACK SAFETY STANDARDS	DEFECTS			MO-103.9 Railroad Trackage Assessment Manual	INSTRUCTION Reference
		MARGINAL	CRITICAL	CATASTROPHIC		
213.141	<u>Self-guarded frogs</u> Raised guardwear	over 5/16"	over 3/8"	See Note 2	8-4.d	3.5.1
213.143	<u>Frog guard rails</u> Check gage Face gage	less than 54 3/8" more than 53"	less than 54 1/4" more than 53 1/8"	less than 54 1/8" more than 53 1/4"	8-5 Table 8-1	none

Note 1. Criteria shown is based on safety standards for Class two (2) trackage. If higher or lower standards of trackage are involved, corresponding FRA Track Safety Standards shall apply. In addition, in accordance with paragraph 213.1 of the FRA Safety Standards, the requirements prescribed in the FRA Track Safety Standards and in Attachments (2) and (3) apply to specific track conditions existing in isolation. Therefore, a combination of track conditions, none of which individually amounts to a deviation from these requirements, may require remedial action to provide for safe operations over that track. Restricted speed or slow orders do not change or reduce the class of track. The classification of marginal defects is based on maintenance standards for Track Category A, as defined in paragraph 2.3.2 of NAVFACINST 11230.1D or paragraph 1-5 of MO-103.9. See Appendix E of MO-103.9 for corresponding standards for Track Categories B & C.

Note 2. The following defects are considered catastrophic and all traffic shall be restricted until repairs are made: (1) Any breakout in the railhead, (2) Defects accumulating three feet or more in any 10 feet, (3) Broken base exceeding six inches, (4) Defects exceeding FRA Class 1 Track Safety Standards. Specific criteria for evaluating the consequences of certain defects outside the range designated as critical is not available. However, when the FRA Safety Standards for Class one track are exceeded, the trackage shall be non-certified. The activity shall evaluate the severity of each such defect and shall classify the degree-of-hazard based on engineering judgment and experience.

NAVFACINST 11230.1D

- Note 3. Guidelines are for visual observation only. Deviations may be estimated, and measurement is not required unless it is necessary for supplemental investigation. Deviations exceeding the criteria shown shall be investigated to determine cause. Defects for flexible supported rail shall be evaluated according to trackage surface standards (FRA Para 213.63). Defects for rigidly supported rail shall be evaluated based on engineering investigation.
- Note 4. Maximum superelevation for high speed mainline or running trackage, with corresponding higher classification and better standards, leading into or passing through the activity is six (6) inches.
- Note 5. An individual tie not fully supported, having missing or loose spikes, having excessive spacing, or other type tie defect will cause the tie to be classified as defective. See FRA paragraph 213.109 for handling of defective ties.
- Note 6. See FRA Standards for description of defective ties and for tie requirements under joints. Generally the maximum center to center distance between sound ties should not exceed 70 inches; however, the centerline of a sound tie shall be within 24 inches of a rail joint. The criteria for consecutive defective ties is based on 21 ties/39 feet of track or greater. Tie spacing of less than 21 ties/39 feet dictates more restrictive criteria.
- Note 7. Indications on tie plates or ties of movement exceeding one-half (1/2) inch shall be considered a defective tie. "Kicked" tie plate with shoulder under the rail should be considered defective (marginal or critical).
- Note 8. Defects smaller than those noted may be classified as marginal provided the defect is inspected six months after discovery and annually thereafter to ensure that the defect is not progressing.
- Note 9. Joint gaps measuring over 3/4 inch when the air temperature is over 30°C (86°F) shall be remeasured when the air temperature drops below 0°C (32°F) to ensure that marginal defects do not exist. Joint gaps over 3/4 inch and less than 1-1/4 inch may be classified as marginal. Joint gaps over 3/8 inch and 3/4 inch or less are not a defect.
- Note 10. Railroad rail may be transposed or interchanged if the horizontal wear on one side does not exceed 3/8 inch.
- Note 11. Criteria for Railroad or Crane trackage crossings shall be developed locally based on design, float and safety.
- Note 12. Switch points must fit stock rails properly. Lateral and vertical movement, and any gap that adversely affects the fit of the switch points to the stock rail is considered a defect.

SUMMARY OF IN-SERVICE CRANE TRACKAGE INSPECTION CRITERIA

TRACK SAFETY STANDARDS	CRITICAL DEFECTS	INSTRUCTION REFERENCE
<u>GENERAL</u>	See Note 1	1.0 and 3.0
OPERATIONAL TEST DEFLECTION	Over 1/4 in. See Note 2	2.4.1.1 and 2.4.2
<u>TRACK GEOMETRY</u>		
ALIGNMENT:		
Tangent, Mid Offset per 62 ft.	Over 1/2 in.	3.4.2.2 and 3.4.2.3
Curves	See Note 3	
Profile, Grade	Over 1%	3.4.3.2 and 3.4.3.3
TRACKAGE SURFACE:		
Profile @ Mid-ordinate of 62' chord, Cross level deviation, and Cross level difference in 62'	Over 1". See Note 3	3.4.4.2 and 3.4.4.3
<u>TRACK STRUCTURES</u>		
SUPPORT STRUCTURE	Deformation, Misalignment or movement exceeding 1/2 in. See Notes 2 and 4	2.4.1.1
RAIL FASTENINGS:		
Hold Down Bolts	The distance between non-defective fastening on either side of the rail is more than 48 in.	
DEFECTIVE RAILS		
Transverse fissure Compound fissure	More than 20% of railhead cross section weakened by defect. See Note 5	3.3.2 and Appendix C, MO-103.9
Detail fracture Engine Burn fracture Ordinary Break	Breakout in railhead with over 1/4 in. movement. See Note 6	
Horizontal Split Head Vertical Split Head	More than 4". See Note 5	

SUMMARY OF IN-SERVICE CRANE TRACKAGE INSPECTION CRITERIA

TRACK SAFETY STANDARDS	CRITICAL DEFECTS	INSTRUCTION REFERENCE
DEFECTIVE RAILS (Cont'd)		
Split Web, Piped Rail head Web Separation	More than 3 in. See Note 5	
Bolt Hole Cracks	More than 1-1/2 in. See Note 5	
Broken Base	More than 6 in.	
DAMAGED RAIL:		
Shelling, Head Checks, Engine Burn, Mill Defect, Flaking-slivered, Corrugated-corroded	Depth over 3/8 in.	3.3.2 and Appendix C, MO-103.9
Flowed Rail	Roll exceeding 5/16 in.	
WORN RAIL:		
Rail section (pounds per yd)		3.3.1.2, 3.3.1.3, and 3.3.2
Web-Base Thickness Reduction:		
Up to 70	Over 1/8 in.	
Over 70	Over 1/4 in.	
Vertical Head Wear:		
Up to 70	Over 1/4 in.	
71 to 134	Over 3/8 in.	
135 and larger	Over 1/2 in.	
Horizontal Side Wear:		
Up to 70	Over 1/2 in.	
71 to 134	Over 5/8 in.	
135 and larger	Over 3/4 in.	
RAIL END MISMATCH:		
On tread or running surface	Over 1/4 in.	
On side of railhead	Over 3/16 in.	
RAIL JOINTS:		
Gap Rail Joints	Over 1/2 inch, See Note 7	
Gap Expansion Joints	Over 1 inch, See Note 7	
Gap Rail to Switch or Frog Joint	Over 3/4 inch, See Note 7	
Bolt Holes	Torchcut or Burned	
Joint Bars	Broken between the middle two bolt holes	

SUMMARY OF IN-SERVICE CRANE TRACKAGE INSPECTION CRITERIA

TRACK SAFETY STANDARDS	CRITICAL DEFECTS	INSTRUCTION REFERENCE
SWITCHES:		
Point Closure Mismatch	Loose over 1/4 in. of movement. See Note 4.	3.5.4
Point Condition	Unusually chipped, worn or flawed.	
FROGS:		
Flangeway depth and width	Develop locally for safe passage. See Note 3 and 8.	3.5.2
Point	More than 5/8 in. down and 6 in. back.	
Tread Wear	Over 3/8 in.	

NOTE 1. Criteria is shown for ground level or elevated crane rail systems that are rigidly supported, such as rails mounted on steel or concrete beams. If other types of support systems are involved, the severity of defects shall be determined based on local conditions. Specific criteria for evaluating the consequences of defects outside the range designated as critical are not available. The activity shall evaluate the severity of each such defect and shall classify the degree-of-hazard based on engineering judgment and experience.

NOTE 2. Guidelines are for visual observation only. Deviations may be estimated and measurement is not required unless it is necessary for supplemental investigation. Deflection for rail systems on flexible supports, such as wood ties and gravel ballast, should not exceed 3/4 inch.

NOTE 3. Determined locally for each specific case based on existing conditions and crane float.

NOTE 4. Building supports, pile foundations, caps, beams, etc. shall be investigated when movement, sag, deformation, or other alignment problems of component members exceeds one-half (1/2) inch. The final classification of defects shall be based on engineering evaluation.

- NOTE 5. Defects smaller than those noted may be classified as marginal provided the defect is inspected six months after discovery and annually thereafter to ensure that the defect is not progressing. Defects accumulating three feet or more in any 10 feet are considered catastrophic.
- NOTE 6. Fractures or Breaks at right angles to the rail may be classified as marginal provided the rigid foundation is solid; there is very little movement of the rail ends; the nearest joint, weld, or break is more than 6 1/2 feet away; and there is a program for continued surveillance.
- NOTE 7. Joint gaps over 1/4 inch and less than 1/2 inch may be classified as no defect provided the joint is tight with no movement. Joint gaps between 1/2 inch and the defect limit indicated shall be classified as marginal or a more serious classification if the joint is loose or if there are other defects present. Gaps measured at defect limits when the air temperature is over 30 degrees C (86 degrees F) shall be remeasured when the air temperature drops below 0 degrees C (32 degrees F).
- NOTE 8. For double-flanged wheels, flangeway depths in vicinity of flangeway width or gap of crossing rail are designed to be slightly less than the depth of flange so that wheels ride on flanges through ramped frogs. Flangeway depths equal to wheels' flanges are not a defect, provided wear on the frog point is not excessive. For single-flanged wheels on a 4 track system, requirements are the same as for railroad trackage, i.e., a flangeway depth less than 1 1/2 inches is a critical defect. For turntable frogs, the flangeway depth shall be greater than flange depth of the wheel.

TRACKAGE CERTIFICATION DOCUMENT

RAILROAD ELEVATED CRANE	GROUND LEVEL CRANE
TRACKAGE AREA/ELEVATED CRANE ID	
INSPECTION DATE: _____ _____	Date of last Operational Inspection: Date of last Non-Destructive Test:

ITEM	COMPONENT	SAT	RESTRICTED	UNSAT	N/A
1.	RAILS				
2.	RAIL JOINTS				
3.	SPIKES/BOLTS/TIE PLATES				
4.	GAGE				
5.	CROSS SECTION				
6.	SWITCHES				
7.	FROGS				
8.	CROSSINGS				
9.	TIES				
10.	BALLAST				
11.	SUPPORT STRUCTURES				
12.	RAIL STOPS				
13.	CLEARANCES				
14.	SIGNS AND APPURTENANCE(S)				

REMARKS:	
CERTIFICATION	
A. This section of trackage meets the applicable standards and is recommended for _____ certification	
INSPECTOR'S SIGNATURE	DATE
B. The section of trackage covered by the attached inspection report is certified as follows:	
FULL CERTIFICATION NON-CERTIFICATION	RESTRICTED CERTIFICATION
CERTIFYING OFFICIAL'S SIGNATURE	DATE

TRACKAGE CERTIFICATION DOCUMENT

RAILROAD	<u>GROUND LEVEL CRANE</u>	ELEVATED CRANE
TRACKAGE AREA/ELEVATED CRANE ID <u>PIER 3</u>		
INSPECTION DATE: <u>15 June 1995</u>	Date of last Operational Inspection: <u>1 June 1995</u> Date of last Non-Destructive Test: <u>4 April 1994</u>	

ITEM	COMPONENT	SAT	RESTRICTED	UNSAT	N/A
1.	RAILS	(1)	(2)		
2.	RAIL JOINTS	(4)			
3.	SPIKES/BOLTS/TIE PLATES	101			
4.	GAGE	101			
5.	CROSS SECTION	101			
6.	SWITCHES	101			
7.	FROGS	101			
8.	CROSSINGS	101			
9.	TIES	101			
10.	BALLAST	101			
11.	SUPPORT STRUCTURES	(3)			
12.	RAIL STOPS	101			
13.	CLEARANCES	101			
14.	SIGNS AND APPURTENANCE(S)	101			

REMARKS: (1) Fracture - No movement (marginal) 120 feet north of switch 28A - Maintain continued surveillance

(2) Bolt Hole Crack - 2 1/2" (critical) west rail 90 feet from pier end Operators to proceed with extreme caution. Reinspect every 30 days.

(3) SAT per review of 4/26/94 control inspection report and underwater inspection of 9/22/92

(4) Expansion joint - 1" joint gap (Marginal) Re-measure in winter.

CERTIFICATION

A. This section of trackage meets the applicable standards and is recommended for Restricted certification

INSPECTOR'S SIGNATURE <u>John Q. Inspector</u>	DATE <u>16 June 1995</u>
--	--------------------------

B. The section of trackage covered by the attached inspection report is certified as follows:

FULL CERTIFICATION

RESTRICTED CERTIFICATION

NON-CERTIFICATION

CERTIFYING OFFICIAL'S SIGNATURE <u>J. D. Official</u>	DATE <u>22 June 1995</u>
---	--------------------------

TRACK INSPECTION RECORD			TYPE OF INSPECTION: [] SCHEDULED MAINTENANCE [] SAFETY INSPECTION [] CONTROL INSPECTION [] OPERATIONAL INSPECTION		
ACTIVITY			TRACK NAME OR ID		REPORT DATE
INSPECTOR <small>PRINT OR TYPE & SIGN</small>			INSPECTION ORGANIZATION		
DEGREE OF HAZARD	LOCATION MILEPOST OR STATION	DEFICIENCY DESCRIPTION	PROPOSED CORRECTIVE ACTION AND TIMEFRAME	FOLLOW-UP ACTIONS	
				ACTION TAKEN	DATE COMPLETED
LEGEND: Degree of Hazard CAT - Catastrophic CRIT - Critical M- Marginal Page __ of __					

TURNOUT INSPECTION CHECKLIST

ACTIVITY		REPORTING ORGANIZATION		INSPECTOR (PRINT OR TYPE/SIGNATURE)	
TRACK IDENTIFICATION	TURNOUT IDENTIFICATION	TURNOUT SIZE		SWITCH POINT LENGTH	DATE
<u>GENERAL</u> Are All Materials Proper Size? YES NO NOTE____ Is Rail Same Weight and Section? YES NO NOTE____ Are Flangeways Clear of Debris? YES NO NOTE____ Are Crib Areas Clear of Debris? YES NO NOTE____ Surface GOOD FAIR POOR NOTE____ Alignment GOOD FAIR POOR NOTE____		<u>FROG</u> Point OK WORN____" CHIPPED BROKEN NOTE____ Top Surface OK WORN____" BROKEN DAMAGED NOTE____ Bolts: OK ____ LOOSE ____ MISSING ____ DAMAGED NOTE____ Guarding Face (Self guarded Frog Only): OK WORN BROKEN DAMAGED NOTE____			
<u>TIES</u> Total Number Defective: _____ NOTE____ Maximum Number of Consecutive Defective: _____ NOTE____ Number of Occurrences of Defective Joint Ties _____ NOTE____		<u>GUARD RAILS</u> Position - Straight OK IMPROPER NOTE____ Turnout OK IMPROPER NOTE____ Condition - Straight OK WORN INSECURE BROKEN DAMAGED NOTE____ Turnout OK WORN INSECURE BROKEN DAMAGED NOTE____ Clamps/Fillers - Straight OK LOOSE BROKEN DAMAGED NOTE____ Turnout OK LOOSE BROKEN DAMAGED NOTE____ Bolts - Straight OK ____ LOOSE ____ MISSING ____ DAMAGED NOTE____ Turnout OK ____ LOOSE ____ MISSING ____ DAMAGED NOTE____			
<u>SWITCH AND STAND</u> Switch Operates Without Difficulty? YES NO (Describe Problem) NOTE____ Switch Stand: OK INSECURE DAMAGED NOTE____ Point Lock/Lever Latches: OK MISSING DAMAGED LOOSE NOTE____ Point Gap - Left NONE LESS THAN 1/8" 1/8" OR GREATER 1/4" OR GREATER NOTE____ - Right: NONE LESS THAN 1/8" 1/8" OR GREATER 1/4" OR GREATER NOTE____ Point Condition - Left OK WORN CHIPPED BROKEN NOTE____ - Right: OK WORN CHIPPED BROKEN NOTE____ Is Point LOWER Than Stock Rail? Left: YES NO Right: YES NO NOTE____ Is Point Rail Beyond Taper HIGHER Than Stock Rail? Left: YES NO Right: YES NO NOTE____ Connecting Rod OK BENT DAMAGED LOOSE BINDING NOTE____ Jam Nut: OK NONE DAMAGED LOOSE MISSING NOTE____ Switch Rods: OK ____ BENT ____ DAMAGED ____ LOOSE ____ BINDING NOTE____ Switch Clips: OK ____ BENT ____ DAMAGED ____ LOOSE ____ BINDING NOTE____ Connecting Rod Bolt: OK ____ LOOSE ____ DAMAGED ____ MISSING NOTE____ Nut On Top? YES NO Cotter Key In Place? YES NO NOTE____ Switch Rod Bolts: OK ____ LOOSE ____ DAMAGED ____ MISSING NOTE____ Nut On Top? YES NO Cotter Key In Place? YES NO NOTE____ Slide Plates: OK ____ LOOSE ____ DIRTY ____ DAMAGED ____ MISSING NOTE____ Rail Braces - Straight Side: OK ____ LOOSE ____ DAMAGED ____ MISSING NOTE____ Turnout Side: OK ____ LOOSE ____ DAMAGED ____ MISSING NOTE____ Heel Filler: OK ____ INSECURE ____ CRACKED/BROKEN ____ MISSING NOTE____ Heel Bolts: OK ____ LOOSE ____ DAMAGED ____ MISSING NOTE____ Heel Joint Bars/Shoulder Bars: OK ____ LOOSE ____ DAMAGED ____ MISSING NOTE____		<u>MEASUREMENTS (Inches)</u> <u>SWITCH</u> Gage Just Ahead of Points: _____ Gage @ Switch Heel: _____ <u>CURVED CLOSURE RAILS:</u> Gage at Joints: _____ <u>FROG:</u> Gage at Point: _____ Flangeway Width: _____ Flangeway Depth: _____ <u>GUARD RAILS</u> Guard Check Gage: _____ Guard Face Gage: _____ Flangeway Width: _____			
NOTES: _____					